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The London Hospital Reports.

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ON THE
VALUE OF THE STUDY OF MORBID
ANATOMY.

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My position for many years as teacher of morbid anatomy has necessarily made me conversant with the opinion of those in our profession who have questioned the advantage arising from a very close study of this science; implying, as they do, that it may have been a hindrance to the evolution of some higher or more generalised doctrines of pathology. Holding myself very different views, I take this opportunity of stating some of the principal facts which the study of morbid anatomy teaches, and also what it may still perform, for I look forward to the future with confidence, believing that the dead body, at the present time, reveals but a tithe of what it will one day be made to proclaim.

It has been said that a study of morbid anatomy may be too eagerly pursued, and that he who is much engaged in this work is apt to overlook the more general principles of pathology; that whilst poring over details, these may assume too great prominence in his eyes, and the larger field of truth which embraces them remain unexplored. Without denying the fact that there may be such an individual who, exclusively devoted to the discovery of petty details, never soars to regions above, or, to use the poet's expression, would "botanise upon his mother's grave," I assert very positively that a devotion to

the study of morbid anatomy has no tendency in itself to produce any such restricted ideas, but, on the contrary, its tendency is to afford a much larger view of the general subject of disease.

For example, a single week's experience in the post-mortem room would be sufficient to show that many diseases which had been localised by the physician when the patient was alive, would then be found to be associated with equally important affections in other parts of the body, or would be shown to be only the most prominent alterations amongst a large number of morbid changes in the tissues. The observer would see that diseases which had been regarded as recent or acute, are but the final results of old-standing degenerative processes; he would soon observe that a number of maladies presenting different appearances, just as the one or the other organ was more particularly involved, and receiving in consequence different names at the hands of the physician, would assume much the same aspect when the body was under the scalpel, and that one pathological condition might include them all. He would see that it was only after death that he had obtained a clue to the true morbid process which had assumed so many different aspects during the life of the patient. One or two examples may suffice to explain my meaning; such as Bright's disease. Here we find a degeneration of the kidney accompanied by certain changes in the heart and arteries, together with derangements in other organs, as the lungs. Such cases present a remarkable uniformity when lying inert on our post-mortem table, but they may be sent to us from the wards under the various names of albuminuria, dropsy, heart-disease, apoplexy, chronic bronchitis, epilepsy, laryngitis, &c. All these affections may be the mere phases of the same real disease; apoplexy, for example, being in a very large number of instances an accidental termination to cases which would have otherwise been *Morbus Brightii*. I would not deny that a very close attention to disease in the living would lead to the same conclusion as is arrived at after death, but it remains for the post-mortem examination to afford such a result at once and with facility. If we take another example, as that of acute hydrocephalus, we find that it very frequently resolves itself, on examination, into a case of general tuberculosis, in which death

was brought about by the most vital organ, the brain. Again, a case of scrofulous phthisis does not generally mean one of simple pulmonary disease, but reveals disorganisation of the lungs, ulceration of the larynx, ulceration of the intestines, and fatty liver. Indeed, a mere accidental occurrence or intercurrent affection in the course of definite pathological changes, is too often regarded as the main disease.

Again, the medical man who is content with the Registrar-General's nosology would have in his list of diseases ascites, cancer of the liver, cancer of stomach, and several other affections of the abdomen, which he might regard as distinct morbid processes, but if he followed the cases to the post-mortem table he might find that they all resulted from the same local pathological change. The patients may have been of the same hereditary diathesis; the same predisposing and exciting causes may have been present in all, and the result may have been the same in the development of cancer in its most favorite seat—the upper part of the abdomen, near the centre of the sympathetic system of nerves, but just as it has grown so as to involve the stomach, or the pancreas, or the gall-ducts, or the portal vein, so would a different organ be involved, and a different set of symptoms be produced. The same disease, indeed, would have received various appellations, just as it may have accidentally grown an inch to the right or the left of a certain spot. Such cases show that it is only the most prominently diseased parts which exhibit their phenomena during life, and that the true pathological changes remain hidden until revealed by post-mortem examination. Sometimes even the symptoms are so indistinct that the real cause of death can only be arrived at by an inspection of the body, or the effects of visceral changes so inappreciable that their existence is not actually known, and thus the surgeon may be content to say that his patient has died of hernia, of lithotomy, or of hip-joint disease, when it really happens that in the first case the result is as much due to a degeneration of all the organs, in the second to a chronic renal affection, and in the third to a general fatty or lardaceous change of the viscera.

It is clear, then, that the morbid anatomist is less prone than he who studies disease in the living only, to localise it; indeed, seeing how rare it is to find morbid changes confined to

one spot, he would have a great difficulty in doing so. Speaking personally, the lesson which morbid anatomy has taught me has been the very reverse of this, and yet such result has, without due thought, been asserted as the tendency of the pursuit. In the cases just mentioned of Bright's disease, which may assume so many different phases, the morbid anatomist would not direct his attention to the brain of the patient who died of apoplexy in endeavouring to discover what were the causes which led to the disease, but rather to the general morbid condition which he finds included in all cases of *Morbus Brightii*, and which lies behind all the more manifest later changes; or in the case of a cancer, growing in the region of the epigastrium, his inquiry would rather be as to the causes of its origin if he were ever to check its progress, rather than a study of diseases of the liver, or jaundice, or ascites, which are but accidental occurrences. Indeed, one of the most striking facts which a study of morbid anatomy reveals, is into how small a category can all diseases be placed. For example, tuberculosis is a subject in itself, it being a minor or less important fact in order to unravel the cause of its production, to study the individual organ most prominently affected. Yet in the living body we are too apt to study the subject of tuberculosis under the name of phthisis, and thus produce confusion by substituting for the disease to be examined several pulmonary affections which have a totally different pathology. We should find that such a disease as *Morbus Brightii*, with all its complications, would stand alone; we should soon discover, by a simple inspection of the dead, that there was such a disease as typhoid fever, merely from the repetition of certain definite morbid changes discoverable in the organs; we should recognise heart-disease, with all its long series of consequences in the body; we should see the fibroid changes which the tissues undergo, or the fatty or lardaceous, and, indeed, in this way there would be done for morbid anatomy what Bichat long ago performed for healthy anatomy.

I would not imply that the investigation of disease at the bed-side is not in accordance with this view, and that living phenomena do not agree with dead facts, seeing that nature cannot contradict herself; but I do maintain that the tendency of the study of morbid anatomy is rather to expose a wider

than a narrower field of vision to the eye ; for although it may conceal much, it reveals more. The two methods of study in the living and the dead should never be placed in antagonism, since they must accord, and, if thoroughly and rightly pursued, would harmonise in every particular, just as we see in a case of phthisis the various phases of pneumonia, pleurisy, bronchitis, hæmoptysis, pneumothorax, may be all recognised during the life of the patient, during the progress of the disease, and after death the existence of every one of these occurrences would again be manifest on an examination of the lungs themselves.

It has been said that the morbid anatomist being familiarised with those changes only which produce a fatal result, he is apt to regard every affection of the living subject as one of severe organic disease, but there is no more reason that he should fall into this error than any other medical man, seeing that the terms in use have the same significance with all. Thus, phthisis means not only the last stage of pulmonary disease, but every previous phase of the affection. The extreme forms of disease are usually described in our text-books as affording the most striking examples for illustration, but when the author explains the changes which are present in a cirrhotic liver, and the symptoms which accompany them, he does not imply that there are no grades between that and a healthy one.

It is true that morbid anatomy fails often to give us any account of the lesser changes which occur in an organ, seeing that when death takes place all such minor alterations are long past, but no one, I should think, would err in connecting too intimately symptoms which had long ceased with morbid states found at a long period afterwards ; for example, with a slight paralysis of a limb, or part of a limb, it would be of immense importance, could the nerve or the centre whence it springs be examined at the time, but, as a rule, the disease progresses to a fatal result, and then the destructive changes would be so great that little light could be thrown upon the connection of this with the early symptoms.

I might also remark, that the changes which are met with in the dead body, as affecting the viscera or tissues, are of a degenerative kind, whether we make use of the naked eye or employ the microscope for their elucidation. In the brain and spinal cord, for example, if there be not evident destruction by

softening we use the microscope, and discover broken tubules, granule corpuscles, fatty globules, &c., all of which are associated with a loss of function of the organ. Inspection of the body has hitherto done little to explain altered or exalted functions, and thus I have been rather sceptical when I have read of changes being found in the brain or cord in cases of mania, chorea, tetanus, &c., especially if the changes described have been of the well-known destructive kind which are associated with loss of function. A degeneration of the brain or cord is looked for in a case of paralysis, an atrophy of the convolutions in mental imbecility, a loss of function being associated with destructive changes; but for the latter to be met with where the function is otherwise altered, as in the above-named diseases, is not what would be expected. It will be observed that in this class of cases, where inspections after death afford so little aid, that the symptoms during life are of the most striking character, and, on the other hand, where organic changes are found well marked and excessive, the symptoms leading to death may be so little characteristic that nothing but an inspection after death could have determined the exact nature of the case.

I would argue, also, and with a considerable degree of confidence, that a study of morbid anatomy, more than any other single method, assists in the diagnosis of disease. At the present day, it must be admitted that there are few pathognomonic signs of disease, but that a diagnosis is made on the method of probabilities; for example, if a stethoscope be placed over the apex of a lung, and when crepitation or other signs of disease be detected, phthisis is pronounced to exist, it is not, as far as I can judge from the writings of authors, that there is any sound distinctive of the presence of tubercle, but the phthisical condition under the circumstances is simply inferred. When the patient presents himself for advice, the doctor observes at a glance a certain diathesis, and that there is a certain deviation from health, and that symptoms are complained of which point to a certain organ as being the probable seat of disease; when, therefore, definite morbid sounds are heard at the suspected spot, he at once infers the presence of a particular disease, or even without such a history he might, with almost equal certainty, infer it from the locality. Our method of diagnosis is to discover in the living, and more especially in

the dead, the various diseases to which flesh is heir to, and then to note the symptoms which usually attach themselves to those diseases ; when, therefore, we meet with the symptoms we infer the presence of the malady, but in the present state of knowledge such symptoms, unfortunately, are not peculiar to that disease, and thus we can only guess, as it were, to which they may belong by some extraneous circumstance, or if we have no such guiding light we connect them with the most common malady with which they are associated ; and should they be connected with a more unusual form of disease, the diagnosis is altogether wrong. By way of illustration—three men are admitted into a hospital in a state of coma, with occasional convulsion. There is nothing in the symptoms which can indicate what is the cause of the phenomena in these patients, but they are correctly diagnosed as drunkenness, tubercular meningitis, and uræmia, because the first is known to have been drinking and smells of liquor, the second because he has pulmonary disease, and the third on account of the presence of albumen in the urine. If from accident or design the clinical clerk had informed the physician wrongly as to these circumstances, the diagnosis would have been wrongly made, there being nothing in the cerebral symptoms to characterise the true nature of the malady. I have known a most skilled physician mistake a case of tubercular meningitis for Bright's disease, solely because there was a little albumen in the urine. It is for this reason, I say, that he makes the best diagnosis who is most familiar with all the diseases to which the body is liable, and thus the great advantages obtainable from a prolonged study in the dead-house. Almost every disease in the nosology would bear out my statement, that its presence is rather inferred than diagnosed, and thus it is that the most absurd mistakes are made in the recognition of disease ; for example, a case of dissecting aneurism of the aorta being mistaken for cholera. The explanation is simple, since the nurse in whom it occurred was employed in a cholera ward, and being suddenly seized with pain, vomiting, and collapse, the prevailing complaint was supposed to have seized her ; at any other time it would never have been conjectured. Thus it is, that it is most important to distinguish between the interpretation which follows certain signs or symptoms and the

diagnosis which follows. Herein lies, I believe, a most important fact for students to know, and which is much neglected in teaching—the reason for its being overlooked is probably from the teacher not being himself aware of the manner in which his own diagnosis is formed. He sees certain phenomena and hastily frames his conclusion, never inquiring how much of that result is obtained directly from the symptoms, and how much from his general experience and from the probabilities in favour of that disease rather than any other. He consequently does not teach the correct method, but would encourage the belief that a long study and observation can alone give the acumen which is necessary. Students thus are led to the belief that a cultivation of the ear will make them proficient in the diagnosis of chest-disease, or of the hand in abdominal disease. Herein lies, I am sure, a great fallacy, having heard students lament their failure in diagnosis, and inquire how long will they be in learning the use of their stethoscope, when those very students have distinguished, for the first time in their lives, a morbid sound as clearly as their master. The difference between them has been but slight so far, but afterwards the superiority of the teacher is apparent, for while the student is utterly ignorant of the cause of the sound, the other interprets its meaning with certainty, for the simple reason that his experience has taught him to discover under what conditions such morbid sound arises. A diagnosis is thus made up of two parts ; the first can afford only limited results ; auscultation, for example, founded on certain physical conditions, can produce only certain definite physical results ; a softening tubercle at the apex of a lung produces crepitation, and (I think) can teach no more than that fluid and air are there intermixed ; but from our knowledge of the history of phthisis, the disease may be very fairly inferred under the circumstances.¹ I would not disparage the cultivation of the ear in the use of the stethoscope, nor would I throw any discredit upon those who specially devote their time to the study of chest-disease, and who attach importance to various modifications of sound as indicative of particular changes ; but I would strongly maintain

¹ This method is applicable to the diagnosis of all diseases ; the subject is one of great interest and practical importance, and I hope to enlarge upon it on a future occasion.

that is only a portion of the student's work, and that the best diagnoses are made by those who not only are well versed in the recognition of the signs of disease, but by those who have a large experience of the maladies which these symptoms represent, and can thus rightly interpret them. I repeat, therefore, that a good knowledge of morbid anatomy is necessary for the diagnosis of disease.

That such a knowledge will often carry with it an appropriate treatment is too self-evident to be insisted on, and thus I daily witness men of otherwise large experience commit grave errors from a want of it. One instance shall suffice; a patient is seized with peritonitis, affecting more especially the cæcal region; whilst one medical man, grey with years, is busy with his leeches, his fomentations, and his physic, another, of youthful age, but who had witnessed half a dozen post-mortem examinations of cases of perforation of the appendix cæci, would know that although a sufficient escape had occurred from the intestine to set up a peritonitis, yet that probably some lymph had been thrown out to seal the orifice, and which, if not removed, and thus a further egress of fæcal matter be prevented, the patient may recover; he would know, I say, that, before all things, absolute rest is necessary, perfect quietude for the body, but, above all, the introduction of nothing which should move the bowels. This would be good practical knowledge, and before anything else would tend to save the patient. The case is not an imaginary one.

I have said that the morbid anatomist after some experience would discover that although no two bodies might present the same appearance as regards details, yet that the general characters of disease would be repeated over and over again, and thus he could reduce the names of pathological changes to a very limited number. The result of his study would not be to complicate or extend but to reduce the nomenclature by generalising or simplifying. After he had seized on certain general pathological states of body, each including certain definite alterations of tissues, he would ask himself how are the changes in each class produced; has there been some one cause which has been powerfully operative in bringing about all these modifications? and if so, has this cause been hereditary, constitutional, or set up by some purely

artificial means? Again, he would ask himself, how far do all those changes found in one particular class depend on one another? or how far are they equally the result of a common cause? For example; in Bright's disease, as that has been before mentioned, the question would be, how far are all the changes here found dependent directly on a common cause, or dependent on one another? also, is that cause inherent in the system, of a constitutional kind, and induced by various obscure agencies, or is it a recent cause of a well-known exciting character? That is, is Bright's disease, with its various morbid manifestations, due to some obscure conditions which bring about a series of changes in the system, or do not these latter necessarily result from the presence of diseased kidneys, and these result simply from the abuse of alcohol? Supposing, again, that alcohol is the prime mover in the production of the disease, the question arises, does the pernicious fluid pervade the system, and produce not only the disease in the kidney but the bronchitis and other affections, or does it act primarily and solely on the kidney, and this organ being deranged necessitates the other changes in the heart and arteries which are usually seen? These are considerations which are suggested daily to the morbid anatomist, and are not only of great interest to him but to the practical physician in the management of his patient. The accommodation of one organ to another, the mutual interchange of relation as regards function, are all as necessary to be studied in the art as in the science of medicine. In the case of organic disease, there is little left for the medical man to do than to study this dependence of one organ on another, to relieve one organ by putting more on another, and bringing about a balance of functions.

When various organs are affected in a very uniform manner, as in the diseases before mentioned, it might be regarded as a fair inquiry to ask whether they depended on a common cause or whether one had necessarily produced the other. When, however, a number of changes of a like kind are found in the body, it has been generally assumed that all these have had a common origin, and that the occurrence of a local affection in the first instance has not been sufficient to produce the remaining. Thus we have been content to find fatty changes

in the tissues, and attribute them to a general cause; we have done the same with the fibroid, and so with the various adventitious deposits, as cancer, tubercle, and lardaceous substances. Why one person is liable to one form and another person to another, is attributable to a predisposition or diathesis, and so the matter is left; the local disease is a mere manifestation of the constitutional. This is the common belief, for in spite of the use of such terms as secondary growth in the case of cancer, the surgeon believes that the removal of a malignant tumour does not eradicate the disease from the system, but that it will again reappear. His experience leads him to this belief of its constitutional origin, and if he sits down in his study and reasons on the subject, his conclusions tend in the same direction.¹ When, however, the whole of the arguments for this view are exhausted (and I have nothing to say against them) there remains an equally important array of facts taught by morbid anatomy to place opposite to them.

And herein is the study of the science which I am upholding capable of revealing most important facts. The question I discuss is, how far are the changes which we see in the system due to some general constitutional cause, or how far may they have been induced by local disease in the first instance. I may state, that I thoroughly believe in the existence of certain diatheses, and with these, predispositions to particular diseases, for whatever opinion might have formerly existed, that healthy persons were liable to all kinds of local affections, such as inflammations, this is held no longer, and no one of any observation recognises such diseases as arachnitis, pericarditis, or peritonitis occurring without some predisposing cause. There is often, however, with such predisposing cause, an exciting one also; and thus, in the case of the goutily disposed, it is often the want of exercise and the intemperate habits which develop the attack. Thus, in any individual case of gout, it may be asked which is the more powerful, the predisposing or exciting cause, or even consider the question, how far the two causes are alike, so that the one may become in time the other; that the very causes which are able to develop gout in any individual might predispose his children to the very

¹ A very good paper advocating this view will be found in the 'Medical Mirror' for October, 1864, from the pen of Dr. Bastian.

same ailment. That a tendency to disease may be induced in the offspring has been observed by many with respect to drunkards, who, with their sottish habits, atrophied brains, and weakened intellects, beget children who are puny in body and feeble in mind, the third generation being a race of idiots, so that the exciting causes may in course of time become the predisposing.

Such questions are of great interest ; but the simplest cases for the elucidation of the subject are those where certain adventitious matters are found in the body, and here one may hope in course of time to discover which influences are most in operation, the constitutional and predisposing or the local. As just now said, the tendency of the profession has been to regard these cases as evincing some latent evil in the body which presently developes itself in the form of cancer or other adventitious growth. If it were not so, it is argued, why should the disease appear at all, or why return after removal, and cause the surgeon to regard the operation of the excision of tumours as a hopeless task. Such beliefs must stand at present, for I cannot say they are incorrect, and yet it is necessary to place in opposition certain facts which apparently have a contrary tendency, trusting that some day they may be reconciled. There can be no doubt that the constitution can be infected from a local source, and yet to suppose that a disease should spring up in a part without some prior morbid condition of system, appears unreasonable. Thus two apparently opposite facts must be reconciled. They cannot be opposed, for the same patients afford the subjects for the apparently antagonistic theories. The antagonism must be due to our inability to see more than on one side of a question at once, and looking at each side separately each appears to belong to a different object. I might illustrate this by what has passed through my mind when travelling by some of the newly-formed railways in the metropolis. Owing to the accustomed road being familiar by its streets, houses, and public buildings, the new route by rail might as well be coursing through a foreign country, so little is the locality recognisable ; and yet we are travelling to the same spot as before, and within a few yards of the old path ; but the buildings are seen in their rear or on their roofs instead of presenting their accustomed aspect. Thus two

different paths may lead to the same destination ; the goal may be reached by totally distinct roads.

Advocates can be found on both sides of the present question ; but those in our profession of good observation and calm judgment, cannot rank themselves on either side. Thus Mr. Paget is obliged to speak with the honest indecision which the subject requires, and say, " I think malignant tumours are local manifestations of some specific morbid states of the blood, and that in these are incorporated peculiar morbid materials which accumulate in the blood, and which their growth may tend to increase." He thus is obliged to admit a predisposition, but cannot but infer infection from a local source. And in another place he says, " The existence of a morbid material in the blood constitutes the predisposition to cancer, and that which makes some part of the body appropriate for the growth of a cancerous tumour is a so-called exciting cause of cancer ; but it is a cause only in so far as it fits some part for the local manifestation of the disease which already in its essential material exists in the blood." The same author also speaks of the constitutional and local causes differing in force, thus, " These two conditions must coincide before the appearance of a cancerous growth. The larger the share taken by the constitutional element of the disease in the production of a cancerous growth, the less is the probability of advantage to be derived from the removal of that growth, while, on the other hand, the more largely the local state enters into the condition upon which the cancerous growth is founded, the more benefit may be anticipated from the removal of the cancer and the locality with it." Mr. Paget also, in our present state of knowledge, is obliged to speak as follows : " I now pass to the consideration of the second necessary precedent of a cancerous growth, viz., the existence of some part fitted to be its seat, some apt locality, such fitness may be natural or acquired." Thus, then, the matter at present stands. The arguments in favour of the constitutional origin of cancer are well known. I will therefore content myself with stating what morbid anatomy is able to teach us on the other side.

In the first place, it must be remembered that a person who is liable to certain peculiar morbid changes in the body, and who thus seems to have a predisposition to these, may have had what appears to be his diathesis produced from a definite

cause. The most striking example of this is syphilis. Here, from the introduction of a minute amount of virus into the system, the whole constitution is changed, and were the cause not known, it would be argued that a person who showed a disposition to disease of a particular kind must possess a certain diathesis. Even if the correctness of the term were denied in such a case, it must be admitted as fittingly applied to his children, or children's children, who, being the subjects of inherited syphilis, would certainly have their predisposition to disease. Some, indeed, would not hesitate to regard this as none other than scrofula. So, in several other cases, a peculiar diathesis might be inferred from the cause of the peculiar changes in the body being unknown; supposing, for instance, that the dark-coloured organs from a person with melanæmia arising from diseased spleen, were occasionally found, and the origin unknown, the affection might be attributed to some general cause of a diathetic kind, or if the organs were found blackened after a long use of nitrate of silver, and the cause unknown, a constitutional diathesis might be inferred. That a definite morbid agent can enter the system and produce all the effects of disease, is seen in the case of lead, which will cause a paralysis, distinguishable with difficulty from the progressive muscular atrophy. Now, if we take the case of disease such as the lardaceous kind, this was supposed originally to be associated with scrofula, and was in consequence styled scrofulous, clearly implying its constitutional origin. And yet the same affection results from syphilis, which is an acquired disease, and, what is more remarkable, it occurs when the illness has been caused by an accidental injury. Thus, a disease which was called scrofulous and constitutional, occurs in the majority of instances in those who have an acquired malady, or one arising from a local origin. Another example may be taken from endocarditis. This is usually associated with rheumatism, an affection where there is an excess of fibrin in the blood, and which is due to a constitutional predisposition, and yet this same endocarditis may occur in connection with pyæmia, a disease having a local origin, and occurring in a person of previous good health. Is this a rheumatism artificially made?¹

¹ A lad, æt. 15, was admitted with an abscess near the knee, involving the joint,

One must also bear in mind that, although believing that a disposition to disease must be present in order to set up such maladies as peritonitis or endocarditis, yet a local injury is quite sufficient to produce the same in any individual.

I will, to illustrate my subject, rather draw attention to cases of new growths, where no doubt can exist that the system is infected from a local source. In the case of cellular or fibrous growths, such as constitute the various forms of tumour, it is assumed by all writers that these may arise in any part of the body when the constitution predisposes; that is, admitting that the predisposition exists, there is no difficulty in believing that a new growth may spring up in any part. But does morbid anatomy teach this? I am inclined to say that it does not, and in this doubt may lie the best solution to the whole question. If it be true that various growths and deposits may be met with in different parts of the body, but if at the same time a study of morbid anatomy should show that they are never met with as primary affections in certain places, a strong argument is found in favour of infection from a local source. Some instances in illustration I have alluded to in a former volume of this work; as for instance, in the bony tumours, such as osteoid cancer and osteosarcoma, where the osseous element is determined by the fact of the growth arising on the bony skeleton. This is certain, for if the constitution determines the character of the growth, we should see springing up in one individual a tumour of one kind and in another individual a tumour of another kind. In certain constitutions there should be, for instance, a predisposition to the formation of bony growths throughout the body; but no such case has ever been recorded. The first tumour has invariably arisen on a bone, and from this source the disease has spread as an osseous malady. This being invariably so, the conclusion is inevitable that the disease which

and also with pains in other joints, with the general symptoms of pyæmia. He died of pneumonia and pericarditis. There were vegetations on the aortic valves, with ulceration of the endocardium and a softening of adjacent muscle, which, penetrating to the exterior, had set up the pericarditis.

A man was admitted with severe injury to his arm from machinery. The limb was amputated by Mr. Poland. He died at the end of a month, with all the symptoms of pyæmia. The lungs, liver, and spleen contained numerous abscesses. The mitral valve was covered with vegetations.

is found scattered through the body is, in part at least, propagated from a local source. Or take another case, of a growth arising in a mole, or in any spot where pigment exists; here the pigment determines in part or wholly the character of the growth, and it is propagated through the body in the form of pigmentary tumours. Diffused melanosis is thus constantly found originating in a melanosis of the eye, the pigment of the choroid having determined its black character. In the case of epithelial cancer the growth is characterised by the presence of epithelial elements, and arising on an epithelial surface; it may affect the neighbouring glands, and occasionally the adjacent solid organs, as the lung or liver; but no one has ever seen epithelial growths originate in these tissues. In such a case the propagation is evident. If, then, we again look to the instances of fibrinous deposits and embolism, we may discover all parts of the system affected in a peculiar way; but in the majority of instances the evidence is clear of the centre of the circulation having been first affected by a precipitate of fibrin on portions of its structure. In the case of pyæmia we observe an analogous disease where not only similar fibrinous concretions may form, but purulent ones, and here the source of them is naturally inferred when an abscess or inflammatory process arises from injury of the surface on a previously healthy person. Many of those who hesitate to adopt the theory of infection do so because all analyses of the blood have failed to discover the deleterious matters within it; and thus they would rather believe that the various local changes are due to some common cause to be found in some unhealthy condition of the circulating fluid, or in some other part of the tissues. In spite, however, of the absence of proof of such adventitious matters being present, I feel no doubt in my own mind of their presence, for in no other way than by the propagation of seeds of disease by the blood can I account for the phenomena which I daily witness. All analogies are, too, in favour of such a view, for the effects of syphilis and smallpox are seen to have specific characters, and induced through the introduction of virus into the system.

What is it which we witness? We see fibrinous deposits occurring throughout the system in connection with the presence of a material of a fibrinous kind in the centre of

the circulation ; we see purulent deposits in the various structures associated with suppuration on the surface of the body ; we see pigment tumours springing up in all parts, after the appearance of one on the skin or elsewhere ; and we witness bony growths arising in the interior of the body, at the same time with a bony tumour on one of the limbs. We ask, then, on the one hand, is the first due merely to a hyperinosis of the blood, the second to a pyæmic condition, the third to a melanotic, and the fourth to an osseous disposition ? if so, we should again ask why these different affections should arise, and the only answer procurable is a constitutional predisposition ; this answer contains nothing, and throws no light on the subject. Suppose, on the other hand, it be shown that in the first case there existed an endocarditis, and thus the fibrin was precipitated in the heart ; in the second, that suppuration occurred on the surface of the body from an accident ; that in the third there was a congenital mole, and in the fourth, that the primary tumour invariably springs up on some part of the osseous skeleton ; then I do not see how any one can resist the evidence, that the local affection determined the general, either wholly or in part. If, besides these four cases, a dozen other instances could be named, the evidence amounts to almost a proof, that the system can be contaminated from a local source. I do not mean that this solves the whole difficulty, nor throws any light on the reason of the first growth arising. The argument is merely to show the propagation of disease from a local origin.

On the supposition that the site determines in part the character of the disease, most important considerations follow, one of which is this, that it is not true that any part of the body can originate all forms of disease. It is remarkable that even those who would agree with me that disease is often propagated from a local source, do not seem to have entered upon the consideration of the question as to whether every tissue is capable of originating all the usual varieties of morbid product. If it be the fact that the different adventitious growths and deposits which we find in the body are not due to a peculiarity in the constitution of the patient, but due, in part at least, to the locality whence they spring, it will explain much of the divergence which we witness in different cases, and from

this arises a corollary of even greater importance, which is, that particular tissues originate within themselves only limited morbid processes. It is assumed on all theories of growth, whether it be that of Schwann or that of Virchow, that the blastema or the cells of a structure can produce new cells of *different* kinds, but why a pus-cell, or a tubercle-cell, or a cancer-cell, is not explained; although it is left us to suppose that the nutritious element of the blood varies in different constitutions. As I before said, it must be admitted that there are different diatheses, and that the predisposition to disease varies in individuals; but the hypothesis is often not necessary, when a simple accident may lead to a long train of sequences. It seems surprising that in works on pathology, the question of the very limited liability of tissues to derangement has not been considered. It is for this reason that I now dwell upon it, as it is one which comes especially into the domain of morbid anatomy, and can only be solved by a more thorough study of the subject. It is true that Virchow asserts that cellular tissue is found in all structures of the body, and thus there is a cell foundation for any further increase of cell growth. The question I discuss, however, is rather one of fact than theory, and must be determined by observation alone.

I believe that a very close attention to the study of morbid anatomy will show that particular tissues can undergo but very limited changes, and that if other diseases be found therein, that the seeds of those diseases are brought from a distance, that they are in fact foreign to it. I much regret that I cannot speak more positively as to the facts connected with this subject, for although my mind has been directed to it for some years, it is one which requires a very long and careful study. I will illustrate my meaning by first taking abscess. It must be remembered that the subject of inflammation has always been treated of by surgical writers, who have studied it in its various phases on the skin or cellular tissue; and thus it has been believed by students that the effusion of lymph, of pus, that the ulceration and gangrene, have been the usual stages of the process in all parts of the body. This is really not so, and the earlier writers on pneumonia knew that inflammation of the lungs did not terminate in

abscess, and herein lies a great and important truth ; that sup-
puration is limited to certain textures of the body. The
tendency of my views is (though at present I must not speak
too dogmatically on a subject which to some would be quite
unorthodox), that the viscera and various other solid structures
do not undergo suppuration ; if an abscess be found in a solid
organ, that the seeds of the purulent matter are brought
hither. It is a matter of fact as regards the lungs, that if
abscesses be found therein, that the inflammation which has
preceded them has not been idiopathic, but that the blood is
diseased, and the source of contamination will be found in
some other part of the body. The practical importance of the
fact is very great in the case of opening a body in which the
cause of death is unknown. Abscess in the lung is then a
secondary process, and never primary. I believe the same
absolute fact holds with regard to the kidney, that if suppu-
ration be found the nephritis is secondary, and the source of it
must be looked for in the bladder or elsewhere. Idiopathic
nephritis, or Bright's disease, never ends in abscess. I believe
the same fact is true of the spleen, that idiopathic splenitis and
its termination in abscess does not occur. With regard to the
liver, although abscess is rare in this country, except in connec-
tion with pyæmia, injury, or local diseases, I must speak with
caution. In hot climates it is said to be of very frequent
occurrence, but even then it is so often associated with
dysentery, that a theory has long been held that the suppu-
ration is secondary to a portal phlebitis. I know that in abscess
of this organ arising under any circumstances, the inflammatory
process has proceeded, in most cases, in the course of the
blood-vessels. From my knowledge of the usual progress of
the disease, I can well believe that even in the tropical hepatic
abscess some extraneous inflammatory process in the intestine
or elsewhere, has been the cause of the hepatic mischief. As
regards the brain, a statement was made by Dr. Gull in a pre-
vious volume of this work,¹ and quite irrespective of anything
which I am now propounding, that abscess of the brain was
never idiopathic, that it was either of a pyæmic character or
depended on a previous lesion on some external part of the
cranium. I must speak with hesitation about the testis, but

¹ 'Guy's Hospital Reports,' series 3, vol. iii.

I believe that abscess is either connected with the external integuments, or it has resulted from softening tubercle. I believe, also, that idiopathic abscess in muscle is rare; when found, being generally of a secondary kind. The occurrence of suppuration in the heart and blood-vessels is, as is well known, denied by the best pathologists. The tendency of all these observations is to show that the suppurative process, instead of being universal, is limited to some tissues of the body, and that many parts are not liable to it.

Now we will take the case of cancer, and the same remarks, I believe, will almost universally hold good; beginning with the lung as before, I am quite ignorant of the spontaneous occurrence of cancer in the lung just as I am of abscess; the disease in this organ occurs under two conditions, either in the form of scattered nodules in the lungs, which is secondary to cancer in the abdomen or exterior of the body, or it occurs in the form of intra-thoracic cancer, a form of disease which begins at the root of the lung, either in the glands or in the cellular tissue around the bronchus, and then gradually grows into the chest, sometimes involving the lung and sometimes merely compressing it. It may be mentioned, that the very fact of the cancer in the first example being disseminated, and which thus corresponds with the pyæmic abscess, is an argument against its being primary, for if so it would begin in one spot, and grow from a centre into a large tumour. As regards the brain, new growths are not of infrequent occurrence, the most common form being fibro-cellular, or one which very much resembles the brain in structure. The true idiopathic cancer is certainly exceptional, and therefore it may be, that in the cases recorded, there were cancers elsewhere in the body, but overlooked. As regards the spleen, I believe I am correct in saying (without reference to my volumes of cases) that I know nothing of primary cancer of the spleen. As for the kidney, in a very large number of so-called cases of cancer of this organ the disease is really around the kidney, and thus assumes the shape of a renal tumour; or if, after death, the structure be found involved, it is only by encroachment of the disease upon it. I believe a primary cancer of the structure of the kidney to be exceedingly rare. As regards the liver, it is said that carcinoma of this organ is very common,

but this, I have no hesitation in saying, is contrary to my own observation. I believe the error has occurred from the overlooking of disease in other parts; the cancer being so obvious in the liver, and of so rapid growth, the organ is felt to be affected during life when the anterior disease has passed unobserved. The stomach should be opened, and its neighbouring parts be examined for the presence of the disease. Even in those cases where no other organic disease can be found, the cancer may have originated in Glisson's capsule about the vessels or hepatic duct (a very favorite seat), and then secondarily involved the liver. This is a very important distinction with reference to the subject I am discussing. In the testis, cancer is too well known as a primary affection to need any comment, but its very exceptional occurrence in this part may have some very important relation to its absence or rarity in other organs.

The subject is too long for further discussion, but it may be remarked that primary cancer of muscle is very rare; that in the intestinal canal, particular portions are selected; that in the uterus it is the cervix and not the body which is involved, and so on. Similar observations might be made with regard to other growths, as of the fibroid kind, which are not seen in particular organs. Tubercle, again, is an affection limited to particular structures and absent from others, as the mucous membrane of the stomach.

The tendency of these observations is to show that certain tissues cannot originate certain diseases; and then the next inquiry which necessarily follows is, what are the primary changes to which each organ is liable? I can conceive scarcely a more important fact in pathology than the discovery that certain changes found in organs are due to the seeds of disease being brought there, and that each part can but undergo the most limited alterations. It may turn out that the sole organic change to which the lungs are liable, is the production of a simple cell-growth as in pneumonia, or to a vitiated cell-growth as in tubercle, modified by the presence of the tissue of the lung, and thus sometimes becoming fibroid. It may be that the pulmonary tissue cannot produce an abscess, or a cancerous tumour, or any other form of adventitious material. It may turn out also, that the liver and

kidney can undergo no other primary changes than those seen in their secreting structure in the cases of cirrhosis and Bright's disease.

That certain morbid conditions are found only in certain structures is well known, as epithelioma, originating in epithelial surfaces, and thus we witness it on the mouth, tongue, and œsophagus; in the stomach we have ordinary cancer. That the tissue determines the character of the disease rather than the constitution of the patient, is evident in many cases, as where hard and soft cancer affect their favorite organs. I will take a hypothetical case, but it is one which might occur. A brother and sister, of equal age, say twins of like diatheses, and with like predisposition to cancer, receive injuries, the one on the testis, the other on the breast; a medullary cancer springs up in the former, and a scirrhus in the latter, owing to the nature of the part affected; the one is soon followed by secondary glandular deposits, and the case terminates fatally in a few months; the other, the scirrhus breast, grows slowly; years may elapse before it is observed, and as many years before it kills the subject of it. The predisposition being the same, the difference must be due to the local influence alone.

Space will not allow me to pursue the argument further, but within the domain of morbid anatomy there lies this subject for elucidation. A further study must show what diseases are foreign to the tissues, and what are the morbid changes which are essentially their own and peculiar to them. The science of morbid anatomy has not revealed a fraction of the facts which it will one day be forced to give us.

ADDITIONAL

CASES OF SUPRA-RENAL DISEASE,

WITH REMARKS.

By SAMUEL WILKS, M.D.

IN the eighth volume of the 'Guy's Hospital Reports' I published all the cases of Addison's disease which had come under my notice, and which included all the examples of the affected organs which had been sent to me from various parts of the country. The series corresponded to the specimens now existing in the museum, and which can therefore be studied by all those interested in the subject. The principal object I had then in view was to show the peculiarity of the morbid change which took place in the organs, and that this was of a much more definite character than Addison himself had at first supposed. Since the publication of these cases several additional specimens have been placed in our museum. These are identical in character with the former, and therefore fully corroborate the statement then made. They constitute now thirty-three-cases in all.

It is highly important that this fact of the peculiarity of the disease should again be asserted, and even circulated as widely as possible, for its want of recognition has operated more than any other circumstance to retard the progress of the discovery, and it must unfortunately continue to do so for a considerable time. For it must be remembered that Addison was not fully alive to it; and as his original work will for a long period be

taken as the text-book on the subject, the error will be propagated, whilst any criticisms or emendations by others will have an equal chance of being overlooked. I therefore take this opportunity of again repeating, that were it possible to retain in his work the first cases described by Addison, and to expunge his later ones, the treatise would be perfect, and the disease placed on a safe and sure basis. If Addison had been content to publish his five irrefragable cases, his treatise would have afforded a solid foundation, on which there might have been erected any superstructure for the future, but unfortunately the author commenced to theorise, as every writer on the subject has subsequently done. The consequence has been, that each one has supposed, that if the disease which the author had observed was accompanied by certain constitutional symptoms, that other and less changes in the organs would be associated with similar though less severe symptoms, and at the same time with slighter degrees of pigmentation of the skin. He thus introduced equivocal cases, which have been taken as examples of the disease. The error of the author was natural, but one which has nevertheless done an immensity of mischief; for when we remember that the symptoms described as occurring in Addison's disease, such as a general weakness of the body and discoloration of the skin, are not in a modified form very remarkable conditions, we can easily understand how, when these were supposed to exist in connection with any affection of the capsules, that the two should be supposed to be necessarily associated. The author having fallen into the error, it is not surprising that others have pursued the same course. It has followed, however, that when a further observation or experience did not warrant the conclusion, a very natural scepticism has sprung up; and even with those who had seen enough to convince them of the reality of Addison's disease, a difficulty arose as to the true nature of the affection.

Now after some years' attention to the subject, I repeat, with much confidence, that the disease of the capsules in morbus Addisonii is uniform and peculiar; that none other than this has yet been found in connection with the symptoms which Addison described, and none other which has been satisfactorily proved to be the sole cause of death. In all the examples which we have now in our museum, amounting to thirty-three,

the disease is of the same nature in all, and this has been the case in all the other instances which have come before my notice at the Pathological Society and elsewhere; also in the description given in all the cases which I have read in foreign journals, as occurring in various parts of Europe, the same form of disease has been present. This peculiar disease is that which Addison and many others have styled scrofulous, using the term to denote an amorphous, yellow, cheesy substance, into which the organ has been converted; this material in some cases being softened into an almost fluid material, and in others becoming cretaceous. This so-called scrofulous matter, however, is due to the degeneration of a previously effused material, which consists of a translucent, tough, fibrous tissue, which might be styled according to our present loose phraseology, a low inflammatory product. At all events, such an expression would be much nearer the truth than calling it scrofulous, for the investing membrane of the capsule which contains the cheesy substance, is converted into a thick tough capsule, and the whole organ is often adherent by fibrous tissue to the liver or kidney.¹

I might also remark, that I have been surprised that men of experience should not have been prepared to regard Addison's

¹ The question as to what are the characteristics of scrofulous matter is an open one, I believe, at the present day. There are certain conditions of system in which certain changes and deposits occur, affecting the tissues to which all are agreed to apply the term scrofulous; but whether any mass of morbid material contains within it such physical or microscopical characters as to warrant a positive decision as to its scrofulous nature, I should have great hesitation in admitting; for whilst, on the one hand, there are those who, following Lebert, speak of a characteristic cell of tubercle and those who regard it as nothing but a direct inflammatory or purulent matter; there are those, again, who would require the warranty of a marked tuberculous diathesis, as evidenced in other ways. Thus it is, that in the disease under notice, that although the supra-renal organs may be converted into yellow cheese-like substances, which may consist of irregular formed cells, yet that in the majority of cases there is no other evidence of scrofulous matter in the body; and, further than this, the patient has died in so early a stage of Addison's disease that the morbid material has not reached that condition to which the name scrofulous could possibly be applied. In some cases, as No. 31 in present series, there was no approach to character of tubercle. A large number of morbid deposits, it should be remembered, when undergoing degeneration put on an appearance like that of scrofula, even cancer itself. Dr. Childs, of Oxford, in relating a case of Addison's disease, calls in question these views, and regards the disease as scrofulous, believing that the naked eye and microscope are sufficient to warrant the conclusion.

disease as a peculiar or idiopathic one on purely pathological grounds, and not been willing to suppose that so chronic and remarkable affection should be dependent on an accidental formation of scrofulous or cancerous matter in connection with similar disease elsewhere. Their experience certainly cannot have shown them cases of either tuberculous or cancerous disease of any viscus being protracted over a period of three or four years and the patients being often in a tolerable share of health in the mean time. On the other hand, protracted diseases of the lungs, liver, kidneys, &c., are due to a chronic inflammatory or degenerative change, and it should be remembered that in studying the diseases of these organs it is phthisis, cirrhosis, or Bright's disease, which would engage our attention, rather than the example of an accidental growth of an adventitious substance. It is not when a cancerous tubercle has affected the lungs, liver, or kidney, that we should look for pulmonary, hepatic, or renal symptoms, and yet surprise is evinced that the symptoms of Addison's disease are not developed when a cancerous or scrofulous tubercle is present in the supra-renal capsules.

In all probability in the well-marked cases of Addison's disease the capsules are irretrievably destroyed as soon as the symptoms are observed, and it is also true that the malady has existed for many years. In this respect the disease is altogether unlike any such affection as cancer, whose duration would be months at the longest. How their destruction has been so long compatible with life is altogether another question, and one which I need not enter upon here, as it has already been commented upon in my previous paper. In spite, however, of the very great difference of the diseases which may affect the organs, many authors have been pleased to collect all the instances of disease of the capsules which come under their notice, and then have endeavoured to discover how far the symptoms which were present agreed with those described by Addison. I have perused all such cases which have been published, and I regard them as quite worthless in connection with the subject of Addison's disease.¹

¹ My object is to show that the disease described by Addison has never been produced by cancer, nor is it likely, according to the reasons stated in the text.

It is another question whether cancer of the capsules, if there be such a disease as

Since the death of the author his treatise has still been taken as the text-book, and herein he alludes to cancer and other affections possibly producing the symptoms which he had described as occurring in the true affection. He, however, had no case to substantiate the supposition, and lived long enough to know that he had committed an error in introducing these extraneous cases into his subject matter. Subsequent investigators, however, not seeing that the author had made the distinction which he should have done, have not regarded the affection as one possessing any peculiarities and, moreover, in making original investigations, they were prompted by the desire to make a full examination into the whole subject of supra-renal disease. It has thus happened with more than one observer, that after investigating the changes which may have been present in several hundred bodies, he has failed to meet with a single instance of Addison's disease. For example, Professor Mattei is evidently in this position. He gives an account of 310 subjects which he had dissected, and amongst these he found 2 of apoplexy, 1 of cancer, 1 of adipose tumour, 4 of tuberculosis, 1 having fibroid tissue, 1 of atrophy, 1 of arrested development, 4 of congestion, and 1 of thickened capsule. Amongst these there is not a single example of morbus Addisonii.

The above-named professor believes that a disease of the capsule is productive of symptoms, and more especially that change which he styled apoplexy of the supra-renal bodies. Thus in a second pamphlet, published in April of the present year, he enters more fully into this subject of hæmorrhage, and carcinoma of the capsules occurring as a primary and solitary affection, is a fatal disorder. I only know of two cases where this was suggested. The one related by Dr. Bristowe, several years ago, and before Dr. Addison had published the result of his researches, and the other, brought before the Pathological Society by Dr. Ogle during the last session. The child was three years old, was an idiot or a cretin, was covered with hair, and the skin was of a dark colour. She died after a short illness, when a large tumour, corresponding to the supra-renal capsule, was found in the abdomen. There were also small masses of encephaloid in the lungs and liver. It was suggested by some that the puny condition of the child, and its dark skin, were due to this disease, and that this had existed since birth. I apprehend that those who believe that a rapid cancerous growth in one capsule can produce a speedily fatal result, must with much stronger reason believe that the symptoms described by Addison, extending over a long period of time, must be due to the slowly developing change which is found in those cases.

finds that it is especially common in the foetus. His paper is entitled "On the frequency and cause of the simple and hæmorrhagic congestion of the Supra-renal Capsules and of other parts in the Foetus." The principal object of the memoir is to prove that during labour the circulation of the blood in the foetus is impeded, and that a congestion with frequently an effusion of blood into the substance of the supra-renal capsules is the consequence; the tissue of these organs being from their laxity more liable than others to this congestion. The professor's conclusions are based upon observations made upon 90 post-mortem examinations of foetuses and new-born children. Upon 74 of them he discovered congestion or effusion of blood into the capsules. According to the degree of congestion the capsules varied from 2 grammes, its normal weight, to 8 grammes. The congestion of the capsules was observed 16 times in the bodies of 22 foetuses examined, 37 times in 39 new-born children, and 21 times in 29 children about a month old. Effusion of blood was discovered ten times in the capsules of the 22 foetuses, and five times in those of the 39 new-born children.

This may be an interesting investigation, but has not, I think, much bearing on the question of Addison's disease; moreover, I am very sceptical as to the importance of the effusion of blood to which Mattei alludes, for I have constantly met with it without the occurrence of any symptoms. In heart-disease and congestive disorders, masses of effused blood are occasionally met with, and should the patient have survived the period of their occurrence, a large rounded fibrinous mass may be left, which becoming soft or disintegrating, may be regarded as a substantive disease, as I have on more than one occasion seen.

Following the same method, but on a larger scale, M. Louis Martineau published a treatise last year, "*De la Maladie d'Addison.*" Herein he has collected together cases of all kinds bearing on the subject of Addison's disease, and having placed himself in a difficulty is perplexed in his endeavour to unravel the true nature of the affection. If he were to eliminate all the cases, except those which show the disease in its true form, in the manner which I have described, he would see that there are no others which are accompanied by

the symptoms Dr. Addison describes. M. Martineau gives two or three original cases of the genuine affection, and to the disease which was found in the capsules he gives the name tuberculous, which clearly defines the nature of the deposit which was present. He then quotes the eleven cases which Addison describes, which of course include not only the perfect examples with the post-mortem examination, but the ambiguous ones which the author unfortunately added to them. He then quotes from English, French, and German journals; some of the cases being good examples of the disease, whilst others are apocryphal. He then details cases of bronzing of the skin, with disease of the capsules, and *vice versa*; also several cases of cancer without bronzing, as well as instances of ordinary tuberculous deposit. He also quotes two cases where the malady was cured.

Under the head of pathological anatomy he mentions, like Mattei, cases of cancer, tubercle, effusion of blood, fatty degeneration, atrophy, &c., and in all these he looks for symptoms. He is aware, however, and rightly, that pigmentation of the skin may occur under many circumstances—as pregnancy, the melanæmia of ague and various cachectic conditions, especially tubercular peritonitis; and quotes Dr. Jaccond, who, in his notes to the translation of ‘Grave’s Medicine,’ says, Addison’s disease is identical with melanæmia.¹

It is clear how M. Martineau, with such a conglomeration of instances, feels himself in a difficulty as to the nature of Addison’s disease, and why he declares that a malady which may be cancerous or tubercular cannot have any definite character, and if more commonly tubercular it is owing to the

¹ Were Addison alive he would be quite prepared for such a refutation of his discovery as this; for his old pupils will remember that when he was discoursing in his lectures, on any novelty, he was in the habit of declaring that mankind was not too willing to admit the merits of a great discovery. It was at first said not to be true; then, if true, of no value; or, if true and valuable, it was already known. As regards Addison’s disease, although it has been accepted as a truth by most writers, there have been many, and are still many, who deny this; whilst others, as two French essayists, declare that the disease was always known, both to the ancients and moderns, under the name of black jaundice. In spite of this silly assertion, at the very time that Addison’s work was in the press, M. Laségue was writing that “the study of the degeneration of the capsules has offered little of interest up to the present day, and it has consequently been neglected by pathologists.”

greater frequency of this disease, and that the alteration of the capsules cannot be regarded as the only cause of the malady of Addison. "Il est evident que la maladie d'Addison ne pourrait etre considerée comme entité pathologique."

He considers, finally, the causes of the symptoms, whether they be due to a poison circulating in the blood from the non-depurating function of the capsule; whether the disease be merely the evidence of a profound cachexia, or whether, with Mattei, the symptoms are not due to an implication of the sympathetic nerve. The latter is the conclusion which most have arrived at who have studied the subject, and it was the explanation given by Dr. Addison himself. I have always believed that the solution of the question was to be found in the implication of the vaso-motor nerves, for the symptoms correspond with those which prevail when these centres are evidently involved; and, moreover, it is clear that the symptoms are not due to the disease of the structure of the capsules, seeing that these are totally destroyed for months or years before the death of the patient. The experiments of both Brown-Séguard and Mattei have shown that by crushing the supra-renal capsules in rabbits, the same results follow as when the sympathetic ganglia are experimented upon. Mattei says, "In a rabbit I violently compressed both capsules at the same moment. The animal gave a sharp cry and fell into a state of prostration. Respiration almost ceased, and in a few minutes it was dead." He also mentions cases where blows on the abdomen or electric shocks also were the cause of death, and he quotes Lobstein, who says, "*Jam diu docetur mortes subitaneas triplici via corpus humanum invadere: per cerebrum nempe, per cor et per pulmonem. Quartam adjicio, quæ est plexus solaris nervorum abdominalium fons atque centrum, plexus qui subita commotione, vellicatione, aut quocumque modo correptus, paralysi afficitur lethali, quam cita mors insequitur.*" The explanation is so important that I will quote what Martineau says, in reference to the nervous distribution in the capsules, a subject which my colleague, Dr. Habershon, has elaborated, and a drawing of whose dissections will be found in the last volume of this work.

The supra-renal capsules receive so many nerves that some authors have considered that these organs are a kind of nervous

ganglion. The fact of the existence of the nerve-cells in their interior appeared to be a positive proof of the justice of this view, but the researches of Nagel, Bardeleben, Ecker, and Frey, show that these little organs are glands. It is true that they receive many more nerves than any other organ in the mammalia, but in the other classes of vertebrata they receive but a small share. Besides, the glandular vesicles found in all classes is sufficient to make them rank amongst vascular glands. The discovery of M. Vulpin has contributed to this view.¹ But at the same time, while they are vascular glands, the capsules contain nerve-cells. Besides, Kölliker thinks that the two substances which compose these organs possess different functions. He ranks the cortical substance in the class of vascular glands, and assigns it a part in the function of secretion, whilst with regard to the great nervous richness of the medullary substance he considers it as an apparatus forming part of the nervous system.

Brown-Séquard has established, after Ecker, Frey, and Kölliker, that the peculiar cells of the gland resemble nerve-cells.

According to Pappenheim and Remak the nerves of the supra-renal capsules are composed only of embryonic fibres. On the contrary, Kölliker maintains that he has seen only true nervous tubes, and no trace of the fibres of Remak. Brown-Séquard has shown that in some animals there exist fibres of Remak. He has seldom found fibres of double outline. Very fine nervous fibres (sympathetic fibres of Bidder and Volkmann) abound in them. This author inquires if the nerves of the capsules are endowed with sensibility, or if they are solely nerves for centrifugal action (vascular or glandular nerves). He has shown that in rabbits and cats there is a very marked sensibility. In dogs and fowls this is less. Nevertheless, in all animals the capsules are incontestibly the most sensitive of all the abdominal viscera.

The nerves of the capsules proceed for the most part from the semi-lunar ganglion and solar plexus. But some of their branches arise from the pneumogastric and phrenic nerves.

¹ He has shown that the blood issuing from the supra-renal vein has peculiar properties. It gives a characteristic chemical reaction, showing a peculiar substance which is formed in the structure of the organ, and is poured into the blood. Sesquichloride of iron gives a bluish tint.

To revert to the statement of Martineau, preceding these observations upon the nervous supply, that he is at a loss to fix the pathology of the disease when the diseases are so various; I feel no hesitation in saying that his memoir does not contain a single case of Addison's disease where the change in the capsules was otherwise than that which is usually styled scrofulous. If he eliminate all other cases the morbid anatomy of the disease is much simplified.

I have stated that in all the cases which have come under my notice the disease has been of one kind; those in my last communication amounted to twenty-five in number. I have now to add eight others, the specimens to be seen on our museum shelves. These will be seen to differ only in the stages of the complaint, or according to the changes which the deposit has undergone.

CASE 26.¹—Prep. 2020³². Edward G—, æt. 18, a book-binder, residing at Islington, admitted under Dr. Habershon into Guy's Hospital, September 9th, 1863. He had been ailing for nearly two years with a general discoloration of the skin, failure of strength, and irritability of stomach. On admission he was universally of a dark colour, and in some parts almost black; he was too feeble to rise from his bed, and had constant sickness. He died after six weeks. The post-mortem examination showed that the body was healthy, with the exception of the supra-renal capsules. These were both disorganized, and occupied by a cheesy substance, containing some calcareous matter.

CASE 27.²—Prep. 2020³³. Maria D—, æt. 22, admitted under Dr. Wilks, in November, 1863. She had been ailing about two years, having become gradually weaker, with discoloration of the skin and attacks of excessive vomiting. She was at last so ill that she was obliged to be carried into the hospital, when it was observed that her whole body was of a greenish-brown hue, and her pulse was almost imperceptible. She lived a

¹ This case is reported in full in vol. x, of the 'Guy's Hospital Reports,' and 'Lancet' for 1864, vol. i, p. 269.

² This case is reported in full in vol. xv of the 'Transactions of the Pathological Society of London.'

month. The body was quite healthy, with the exception of the supra-renal capsules; in these no traces of the healthy tissue could be seen, but they were converted into tough, yellow, dry material, mixed in some places with a cretaceous substance. There was some tough fibrous material intermixed.

CASE 28.¹—Prep. 2020³⁴. Harriet R—, æt. 19, was admitted under Dr. Habershon, in September, 1861. For about two years her health had been failing, and her skin becoming discoloured. On admission she was as dark as a mulatto, complained of feeling weak, but was able to walk about. The case was regarded as one of supra-renal disease, and her portrait was taken with this view of the case. After she left the hospital she became still darker, so that in parts she was as black as a negress. She lived until April, 1864. The capsules were the only organs found diseased, and these were changed into a small mass of white semi-cretaceous substance.

CASE 29².—Prep. 2021⁸⁰. The specimen was sent to me by Dr. E. B. Truman, of Nottingham. The patient, a man, was 26 years of age. He had been ill only a few months, with excessive weakness and loss of energy, with a general discoloration of the skin of a yellowish-brown colour. There was no indication of disease of any ordinary kind. The post-mortem examination showed the right supra-renal capsule was enlarged to twice its natural size, and on making a section was seen to be densely infiltrated with what appeared to be yellow tubercle. The left supra-renal capsule was similarly diseased, but was not quite so large as the right one.

CASE 30.—Prep. 2020³⁵. This specimen refers to a diseased supra-renal capsule, sent to me by Dr. Inglis, of Worcester, on May 30th, 1864. This is a very perfect example of the disease, the organ being converted into a large mass of yellow, cheesy substance, and enclosed in a thick investing membrane. Dr. Inglis was not able, unfortunately, to procure a detailed history of the case, and thus could only send me the following.

¹ This case is reported in full in vol. x of the 'Guy's Hospital Reports.'

² This case is reported in full in vol. xiv of the 'Transactions of the Pathological Society of London.'

“Knowing that you are interested in the pathology of the supra-renal capsules, I have forwarded a specimen I obtained to-day on making a post-mortem examination. I can tell but little about the case. The man was sent to the infirmary here from Evesham, when the house-surgeon directed my attention to him soon after admission. I saw that the man was sinking rapidly, and he died the same evening. He had a peculiar leaden hue of the countenance, which, at the time, I ascribed to want of proper oxygenation of the blood, but which was doubtless the bronzed colour of the skin. He had consulted Sir C. Hastings on three occasions, not long since, and had at that time the bronzed hue. Sir Charles believed that he had disease of the supra-renal capsules. If not giving you too much trouble, I should be glad to have a line, to say what form of degeneration the disease is. The capsule I send is the right. The left is also diseased, but not so far advanced.”

CASE 31.¹—Prep. 2021⁸². Wm. T—, æt. 31, a publican, living in Southwark, admitted under Dr. Gull's care on December 29th, 1862, and died on the following day. He had been ailing about four months, or a little longer. At this time he began to get weak, and it was thought that he was in a consumption. He often had pains in his back, numbness in his legs, and often rejected his food. He was examined by two or three medical men, who could find nothing the matter with him. He at last became so prostrate that he was obliged to take to his bed; vomiting also, then coming on, he quickly died.

Post-mortem examination.—No disease in the body except in the supra-renal capsules, no excess of white corpuscles in the blood. Both supra-renal capsules were destroyed, and converted into large masses of an albuminous substance, these being considerably larger than any that had yet occurred in the hospital. They also consisted of a material indicating a much more recent formation than in most cases which have been before observed; they were more than half the size of the kidney. The adventitious substance was soft, like tallow and lard, and although of the same nature as had been observed

¹ See case, fully reported in ‘Lancet,’ 1863, vol. i, p. 116.

in similar cases, but never in such abundance or purity as in the present instance; for in most cases a portion of this material has been converted into a cheesy substance resembling tubercle, or has become cretaceous. The right semilunar ganglion was imbedded in the diseased mass, whilst the left lay close to the capsule, and its nerves were involved in it.

CASE 32.—Prep. 2021⁸⁴. The specimen to which this refers was sent to me by Dr. Strange, of Worcester, on January 22nd, 1865. The organ is enlarged and converted into a mass of cheesy consistence with some cretaceous matter. The envelope enclosing it being much thickened. It was accompanied by the following note:

“Knowing that you take an interest in *Morbus Addisonii*, I send you by this post the supra-renal capsules which I removed from a patient with bronzed skin two days ago.

“I give you an outline of the history, as far as I can ascertain it. Eighteen months ago he was seen by a surgeon for some slight febrile attack, the bronzing then slight, in patches. I saw him twelve months ago as an out-patient; the bronzing was well marked all over the face and hands, the rest of the body clear; the line across the forehead was very distinct. I remarked on first seeing him, ‘here is a typical case of the disease if ever there was one, and we shall inspect him one day.’ I had him under view for some months, when his chief symptom was muscular debility. Appetite not very good, no vomiting. He was sent in the summer to sea by a surgeon, who thought that sea-sickness would clear his skin. He afterwards went about as usual, but never able to work, when he at last died of exhaustion with delirium.

“He was twenty-six years of age, slight, but well made; not thin, having half an inch of fat on the abdomen. Every organ in the body remarkably healthy. There was not a tubercle or scrofulous deposit to be seen, the body was as healthy as that of any young person killed by accident. The right capsule was large, adherent to the kidney, and distended with pus, about a table-spoonful or more had escaped. The left capsule, the smaller one, appeared to be commencing to degenerate.

“A good independent testimony occurred in this case. A

surgeon of the infirmary, seeing the capsules lying on the table, and hearing that they had come from a patient just inspected, exclaimed, 'then they are from the man Barnes.' It appears that the surgeon had vaccinated the man eighteen months ago, and was then struck with his dark skin."

CASE 33.—Prep. 2021⁸⁶. The specimen to which this preparation refers, was sent to me on May 29th, 1865, by Dr. Gilbertson, of Preston, with the following note:

"Having read with much interest your papers on Addison's disease, I take the liberty of sending you the left supra-renal capsule taken from the body of a woman aged fifty years: was tolerably well until about seven weeks before her death, when at a catamenial period she was attacked by vomiting and prostration, but had no pain, nor other dyspeptic symptoms: the sickness continued for three days. In three or four weeks afterwards a very similar attack occurred, and for a third time, on the 21st of May, when she was in Manchester. She returned with difficulty to Preston, and was then seen by Dr. Marshall; the vomiting was incessant and quite uncontrollable. There was no pain, but the prostration was extreme. On the 24th of May Dr. Gilbertson saw her in consultation, when he suggested that the patient was suffering from *Morbus Addisonii*; Dr. Marshall coincided in the opinion, and said that the idea had previously occurred to him. The idea was suggested by examination of the patient, when her skin was seen to be of a dingy-brown colour, especially of the forehead and face, and which beneath the eyes was almost black. The whole surface of body was somewhat dingy, but more especially that of the chest; this discoloration was said to have been noticed for two or three months. The sickness and vomiting continued, the pulse almost imperceptible, but she retained her faculties to the last, and she died exhausted on May 26th."

The supra-renal capsules were converted into a firm cheesy or lardaceous substance, in every respect like what has been hitherto observed in Addison's disease.

CASES OF ENLARGED SPLEEN,

WITH

REMARKS ON THE OPERATION FOR ITS REMOVAL.

By SAMUEL WILKS, M.D.

CASE 1.—Henry B—, æt. 48 ; worked at a hop warehouse in the Borough ; never lived in an aguish district. He had been getting feeble and somewhat thin, when he accidentally discovered his abdomen larger than natural, and then he sought advice. He had a severe injury to the left side of his chest, and broke his ribs two years before, but had got over this accident. He has had no spontaneous hæmorrhage nor epistaxis, but having struck his leg six months before admission, it bled very profusely. When first seen, his spleen reached to the pelvis, and inwards to the mesian line of the body. The blood, when examined microscopically, showed a great excess of white corpuscles, apparently more being present than red. He took various remedies, but without any result, and gradually became weaker, until he died at the end of twelve months after first coming under observation. He had probably been ill altogether about two and a half years. The post-mortem examination showed no disease in the body except the hypertrophied spleen.

CASE 2.—Eliza E—, æt. 26, under Dr. Rees, May, 1862. Very ill on admission, with enlargement and pain in abdomen.

Spleen felt much enlarged ; the lungs contained tubercles. There were universal adhesions of the intestines from old peritonitis, so that all the abdominal viscera were glued together. The spleen reached nearly to the pubes, and was closely adherent to the abdominal walls, having the descending colon running down on its inner side, it having thrust out the colon from its usual position. The capsule was much thickened. The rectum showed the organ very firm and fleshy. No juice to be expressed, and no corpuscles nor deposit to be seen. It appeared to be simply the healthy compressed splenic tissue.

From a perusal of cases of this kind, it is very clear that death results from an impoverished condition of the blood, induced by the state of the spleen. Experience also shows that medicines are quite inefficacious in its reduction ; quinine, which will diminish the size of a spleen which is temporarily enlarged under a miasmatic influence, is quite inert in the present form of malady ; absorbent remedies, as iodide or bromide of potassium, which tend to remove adventitious products of a low organizable character, are useless in their action on a normal healthy tissue, unless indeed given in doses which would be poisonous to the whole frame ; there is therefore no more possibility of reducing the size of an hypertrophied spleen than there would be in causing the absorption of one of natural size, or of any other viscus in the body. Under these circumstances, when all remedies are useless, it has been suggested whether the removal of the organ would be a justifiable operation, and whether there are sufficiently good reasons to expect success.

I believe that extirpation of the spleen has never been attempted in this country, and it being a subject which has not attracted the attention of the profession, I will offer a few observations which may be made for or against the advisability of such an operation. In the first place, as just now said, it is very evident that hypertrophy of the spleen is a fatal disorder. I have now seen several cases where death is due simply to the undue action of this particular organ. The disease is thus a peculiar one, and possibly stands alone in the series of morbid or unhealthy conditions, for although an analogous state can be theoretically supposed to exist in other

organs, yet as far as I know, these have never been known to occur. When an important organ, as the liver or kidney, becomes degenerated, its function may be in part deputed to another viscus, but not wholly so; and thus the balance of function being lost, a departure from health ensues, and life gradually ebbs away. An analogous though opposite condition, would be that where a function is excessive from the increased size of the viscus, but of this I know of no positive example, except that of the spleen. When this organ is enlarged, its tissue is increased in amount, its function is excessive, the blood becomes altered, and death at last ensues; the cause being indeed an excess of spleen. Could the organ be reduced in size, as far as we can judge recovery would ensue.

It is very remarkable that the converse statement is not also true, that too little spleen, as caused by atrophy, should be attended by a morbid state of blood and corresponding effect on the whole organism; and thus it seems feasible that the organ might not only be removed with impunity, but, if diseased, with advantage to the patient. Three reasons might be given; first, the fact that in the lower animals the operation of removal has oftentimes been performed; secondly, that the organ has been removed in man by accident, and without any untoward symptoms resulting; and thirdly, that the spleen is often found so shrunken and of so small size, that in all probability its function has been long in abeyance.

The removal of the spleen in animals has been done so often with impunity, and with so little apparent effect on their health, that the fact has given rise to much surprise to physiologists, in reference to the uses of the organ. Dr. Crisp quotes a description from the '*Gazette Medicale*,' in which a dog is said to have died during an epidemic, six and a half years after having his spleen removed. In the interval, his health had always been good. A post-mortem examination could discover no trace of the organ. The same author mentions the case of a dog who had its spleen extirpated, and enjoyed good health for two years, when being killed and examined, it was found that the organ had been reproduced. There were found cicatrices of the ligatures, and the author believed that the new spleen had grown from a portion of the old one which had been left behind. This case has been scarcely credited by

some, but if it be reliable it is a most remarkable one, and ought to throw some light upon the physiology of the organ. The statement of its entire reproduction where the whole has been removed, and without any portion being left as a nucleus for its growth, would scarcely be worthy of credence ; but on the latter supposition, the fact may be accepted as being quite in harmony with the simple hypertrophy of the spleen, for if an organ of a given size can grow to several times its normal standard, there appears no reason why a small portion remaining after an operation, should not again grow to the original dimensions. For it must be remembered, that not only when a portion of an organ is destroyed may the remainder grow, as is sometimes seen in the liver, and very often in the case of the kidney, when one doubles its size to compensate for the atrophy of the other, and therefore, that the spleen might, without any forced analogy, follow on the same rule ; but in the case of the spleen, the organ may grow to twenty times its natural size, and therefore the greater supposition that there is nothing extraordinary in the fact of the regrowth of the spleen from a small nucleus. The fact is an interesting one in a physiological point of view, for just as one kidney grows when the other wastes, in order to perform the proper depurating renal function, and is stimulated to this growth by a want in the system for the removal of the blood, so we may suppose that the spleen grew again for a similar purpose ; or if we take the doctrine so well enforced and illustrated by Paget, that every part of the body administers to some want in the system, and that perfection would be absent without it, still it must be admitted that some structures are less important than others, as when the hair falls off the patient is not sensibly affected, and yet the growth of the hair is mentioned as an example of a process which may at one time be necessary for the integrity or welfare of the whole organism. Thus it may be with the spleen, that it holds a subordinate office in the animal economy, and thus, although its excessive function might prove injurious, yet its loss might be of no importance, or be delegated to another set of organs, as the lymphatic glands. It is remarkable, that the latter are the only organs besides the spleen which are supposed to undergo the hypertrophic process.

Besides the experimental removal of this in animals, the spleen has been torn out by accident in the human subject, as for instance, in that given by Morgagni. "The patient was a woman, who in consequence of an abscess, which formed and opened at the umbilicus, the spleen was removed. The patient had complained of violent pains, especially below the left hypochondrium. The spleen had descended to the navel and was extracted, and the woman survived its removal five years, within which period she became pregnant and underwent parturition. On examination of the body after death cicatrices were observed on those parts to which the spleen naturally adheres, but there was no appearance of a spleen." Several other cases may be met with in medical works.

The third reason why it may be supposed that a patient may survive without a spleen is not to be considered of equal weight with the foregoing, but it is a remarkable circumstance that the atrophy of the spleen has no analogies with other organs. The organ may be found shrunken into so small a compass, and surrounded by so thickened a capsule, that its enlargement seems impossible, and its appearance would suggest that the function of such a withered organ had altogether ceased. Yet if so, there are no symptoms to indicate its loss.

I consider the above reasons sufficiently prove, that if the enlarged spleen could be removed with facility that the patient might recover the health which he had lost through the excessive operation of its function, and might live for many years without the organ just as the dogs or other animals which were experimented upon.

I was unaware, when commencing to make these remarks on the feasibility of removal of the spleen, that the operation had been suggested much less performed.¹ I have found, however, that the operation has been done in Germany, and a small treatise written on the subject by Dr. Gustav Simon, of Darmstadt, in 1857. The case which he gives was under Dr. K  chler, who performed the operation in 1856. The author

¹ On the exhibition of a spleen during last year, at one of the medical societies, I accorded with the opinion of Mr. Spencer Wells, who declared he was ready to remove the organ when enlarged. If he saw no practical difficulties, I saw no physiological ones.

also refers to two other cases, one occurring several years before, under Quittenbaum, and the other more than three centuries ago in Italy, under Zaccarelli.

The last-mentioned case, where the operation was performed so long ago and where the details are so few, is not of much value in the present discussion; and as Simon says, description at that time is so mixed up with fable that it is scarcely reliable. The case is that of a young man, æt. 24, who resided in the kingdom of Naples, and who had an abdomen of immense size from enlarged spleen. It was determined, therefore, to remove it, this was done by Zaccarelli, in the year 1549. He made a simple incision and removed the spleen. The wound healed in twenty-four days.

The second operation was performed by Quittenbaum, in 1826. The patient was a young married woman, living near Rostock, and had her abdomen enlarging for several months; this causing her great disquiet, she requested an operation. This was performed by Quittenbaum. He made an incision ten inches long, from the ensiform cartilage to three inches above the symphysis pubis. Some pints of fluid escaped and the spleen was seen, measuring ten inches long and five broad; it was found to weigh, on removal, nine pounds. He felt the spleen free all around, he placed a ligature by means of an aneurismal needle around the vessels, and then cut through them above—only a little blood was lost. The intestines were replaced, the ligature of the splenic vessels brought outside the wound, which was united by sutures. The patient slept after the operation and then rapidly sank, dying in six hours without pain. The post-mortem examination showed no serous exudation. The ligature was fast, and embraced a small portion of the pancreas. The liver is spoken of as hard, which leaves a question as to its being cirrhotic.

In this case opinions varied as to the cause of death, whether this was due to exhaustion, to irritation of the peritoneum, or to the implication of the sympathetic nerves. It is probable that in the absence of loss of blood, one of the two latter, or the two combined, was the cause of death; for it is well known that after the removal of ovarian tumours, and after various operations involving the peritoneum, that the patient may sink in a few hours; and it is also probable that had life

been prolonged for a short time longer, that all the results of a peritonitis might have been apparent, and thus that the patient sank at the first stage of what would have been a peritonitis. When a viscus ruptures a collapse may suddenly occur from the shock produced to the peritoneum, and which soon develops into an inflammation. Should death occur, the results are not seen. There is nothing, therefore, remarkable in death speedily occurring after so severe an operation. As death in this case arises through the shock given to the sympathetic system of nerves, the cause would be aggravated by a ligature being placed on the vessels of the spleen, and so many nervous filaments being crushed. In the present case, too, if the liver were not healthy, another cause would be in operation tending to the fatal result.

The third case, where an operation was performed for extirpation of the spleen, is of comparatively recent date, being done by K  chler in 1855. The patient was a man   t. 36, and had had intermittent fever fourteen years before, and since that had had constant pain in his side. It was determined, therefore, to operate, and remove the enlarged spleen which gave rise to it. This was done under chloroform. An incision was made at the border of the left rectus abdominis, four inches long, beginning an inch below the cartilage of the rib. The convex surface of the spleen was exposed and its end brought to the opening, and then extracted lengthwise. A ligature was afterwards put around the vessels, and it was then removed. It was fourteen inches long, seven broad, and weighed three pounds. The man died two hours afterwards. The post-mortem examination showed one and a half pound of blood in the peritoneum, and to this death was probably due. The h  morrhage was supposed to be owing to a small artery supplying the spleen, and which had escaped the ligature. The other viscera were healthy.

As Simon truly remarks, that in cases of enlarged spleen the blood is in a diseased state and therefore the patient in a bad condition for the operation, besides there being a proneness to h  morrhage. Herein lies no doubt one objection to the operation, that the patient is necessarily in a weak state of health from the existing leucocythemia, and, therefore, some time must necessarily ensue before the blood rights itself. The

operation would not, therefore, stand on the same footing as ovariectomy, even though the removal of both organs was equally unimportant, for in one the patient may be in good health, whilst in the other he is necessarily enfeebled from the very presence of the disease.

As regards the operation, the one that was performed in the last-mentioned case was that considered best, consisting of an incision on the left side of the rectus abdominis from the situation of the diaphragm downwards, over the spleen, and then turning out the end and tying the peduncle. It has been proposed by some to dissect the peduncle, so as to separate the nerves from the vessels, and then tie the latter separately. Adelman has proposed that the operation should be divided into two parts. First, the removal of the spleen from the abdomen through the smallest possible opening, then allow adhesions to form and the opening to close ; finally, the separation of the organ.

If, therefore, we contemplate the above facts, that the organ may be removed with impunity from the lower animals, and that it has been done accidentally in the human subject, there seems to be good grounds for the belief that if its removal could be accomplished with safety that the patient might survive without it. The drawbacks are the leucocythemic condition of the patient at the time, and the dangers of the operation. As regards the latter, I think our past experience is of too slight a nature to hazard an opinion. If in a few well selected cases a fatal result inevitably ensued, an unsatisfactory conclusion must be adopted, but in the meanwhile, if a patient, knowing he is suffering from a mortal disorder, wishes for an operation, and being fully aware of the hazard attending it, I think there is sufficient justification for the surgeon attempting it. At all events, I think the different reasons above given may be fairly considered as rendering the extirpation of the spleen a feasible operation. The second case I have quoted in order to show the difficulties arising from the presence of universal adhesion ; such an instance, however, is exceptional.

REPORT ON LARDACEOUS DISEASE.

By SAMUEL WILKS, M.D.

THE subject of lardaceous disease has been much investigated of late both with respect to its pathology and chemistry. As regards the latter, few English observers have been willing to endorse Virchow's opinion, that the adventitious material is amyloid in character, considering it rather as a peculiar substance of an albuminoid nature, and more allied to cholesterine than any other hitherto recognised proximate principle. As regards the pathology of the disease, it is only by an inquiry into the class of cases in which it occurs that a satisfactory conclusion can be formed, and it is with this object that I offer a report of the cases which have occurred since my last published list. I have very little further to add to what has already appeared in the present series of the work, both as to the pathology of the disease and the nature of the peculiar matter which is effused.¹ A series of cases, however, will afford some material for future investigation.

In my paper published in 1856, I gave a report of thirty-six cases of lardaceous disease which had occurred during the four or five previous years; I now offer a further list of sixty cases which have occurred during the nine subsequent years. The whole series, containing ninety-six examples, proves indisputably that the disease is one implying a long standing and deep seated cachexia, and which is seen in its most intense form after a protracted caries and necrosis of the bone, which has

¹ See an essay by Dr. Wilks, in vol. iv, and by Dr. Eavy in vol. x, of the present series.

had its origin in tuberculosis or syphilis. If no affection of the osseous system be present, the lardaceous disease is associated with tubercle in other parts of the body. The few cases where no such histories of syphilis or scrofula are given, are mostly those where the patient was too ill to give any account of himself, or the clinical clerk had failed to ask the necessary questions; and thus, although no mention is made of the above-named usual conditions, they might have existed. Excepting these few cases, it will be seen that the great mass of lardaceous disease is associated with disease of the bone, syphilis and scrofula.

Its connection with tubercle had suggested many years ago the name scrofulous liver, in those cases where this organ was affected. The earlier observed cases also were mostly those where there had been a long standing disease of the spine or hip-joint in a young person, and the visceral disease being believed to be connected with the diatheses which set up the local disease, there seemed good reason for the adoption of the name. It has, however, been observed of late years, that the same lardaceous condition is just as likely to occur if the osseous system has been affected by syphilis, where the affection of the bone and the cachexia are acquired from external causes; and more remarkable still is the fact, that if the bone of a healthy person has been injured by accident, and the patient fall into a bad state of health, and the part becomes necrosed, the patient will eventually die with a similar lardaceous disease of the viscera.

These observations lead one to consider, whether the affection is purely constitutional, or whether, with Virchow and some others, that the system is infected from a local source. I have already dwelt on this subject in a previous essay, as one of great interest in reference to general questions of pathology, and also in reference to its practical bearing in surgery. If a man who is previously well receive an injury and fall into a bad state of health, and various morbid conditions of tissues ensue, these may be attributed to some general causes induced by a newly acquired mode of life; but when the morbid changes which ensue are definite in character, and are met with after injuries to a particular portion of the body, it is reasonable to associate the local lesion and the final result in a very close

relationship, if not as cause and effect. That a new material formed in a particular part of the body is taken up and deposited in various tissues, is a statement of which I have no evidence to prove the correctness, although, as a theory, it is as applicable to the facts as any other which might be surmised. It does indeed appear remarkable that a disease, which for a long time was considered to be of a scrofulous nature, and is without doubt often associated with scrofulous affections, should be so often met with in the cachectic condition resulting from an acquired disease, and occasionally, too, in persons showing no uniform diathesis, whose health has been deranged by an accidental injury. Several instances of the kind will be found in the list, such as that of No. 89, where a strong young man in good health fell and struck his hip, a disease was set up which caused his death at the end of two years ; his organs were then found to be lardaceous.

The phrase amyloid degeneration is one which I never use, as being, I believe, incorrect in both its terms ; the first has not yet been proved to be true, and the second is a word generally used when one tissue is replaced by another, such as when fat or fibre take the place of good muscular tissue ; but when the deposition of a new material occurs in a healthy part, the term degeneration is not applicable, as for instance in the case of cancer of tubercle. Thus a liver filled with lardaceous material has so much adventitious matter added to it, and is so much heavier in consequence ; the spleen in like manner shows a distinct deposit, and the kidneys are often much larger and heavier than in health. After a time the new material may cause destruction of the healthy organ, and then the term might seem to be more appropriate ; but even at that stage I do not know that the term lardaceous degeneration of the liver is more correct than would be the term cancerous degeneration of the liver when malignant disease had invaded the organ to its almost complete destruction. The distinction is not unimportant, and is scarcely, I think, sufficiently dwelt upon in the case of fatty deposits, where the term degeneration is in constant use. In the case of the liver, there is little doubt that a considerable excess of fat takes place in many temporary diseases, and is again absorbed ; but when the whole organ becomes choked with fat, its function is impaired, and its secreting structure dege-

nerated. This process in the liver is different from that which in a muscle is styled fatty degeneration, for in this case the normal elements are replaced by fat.

Without doubt, the lardaceous affection leads finally to the destruction of the healthy elements of the liver and kidney, or at least prevents the due fulfilment of their function. As regards the kidney, this is very evident, for death usually occurs through this organ, even when the liver appears to be equally affected. The symptoms, as far as I have observed, are not distinguishable from those met with in Bright's disease, the diagnosis being made as an inference from the class of subject in whom the renal symptoms appear. These, as in other chronic affections of the kidney, being albumen, pale urine of low specific gravity, without deposit, frequency of micturition, the presence of dropsy varying. I need scarcely mention that the term *waxy cast* was applied to the wax-like microscopic cast of the uriniferous tubules, long before the term waxy kidney came into use, and even before the disease was recognised. The waxy cast and waxy kidney have no necessary relation to one another. The lardaceous deposit, I might also say, by no means precludes the presence of other albuminous products, or fatty matters in the kidney. It is well known that the blood-vessels seem to be the tissues which are first affected by the deposit, and thus in the earlier stages of the disease the application of the tincture of iodine causes the Malpighian corpuscles to start out as a number of dark points; if the organ is thoroughly saturated with the deposit, as it sometimes is, then the whole surface of the section becomes darkened by the test. If any doubt should arise about the colour, it is well to compare the effect on a healthy organ, when the mere yellow coloration by the iodine is strikingly contrasted with the dark brown tint on the diseased kidney.

As regards the spleen, the disease is only ascertained to exist by its discovery after death; no symptoms, as far as I know, ever having been perceived to be associated with the lardaceous affection.

The liver may be considered to be affected during life by its enlargement and hardness, as ascertained through the abdominal walls, and by the class of case in which it occurs. It might be thought remarkable that there are no characteristic

symptoms, but it must be remembered that we are equally at a loss for a recognition of diagnostic features when the organ is affected by other structural changes; and thus lardaceous disease is only on a par with cirrhosis, and other affections. Indeed, it is very remarkable that, although liver complaints (as they are styled) are more spoken of by medical men than almost any other maladies, yet that no organ has so few characteristic or positive signs of structural derangement. When the organ becomes so hard from cirrhosis that the blood will not circulate through it, a diagnosis of hepatic disease is made, but previous to this it is only inferred from a general derangement of health and the habits of the patient. So little are the symptoms characteristic, that the earlier ones may be purely gastric, and the ascites due to an accidental obstruction of the portal vein. From the latter simple fact I have seen cirrhosis considered to exist. Lardaceous disease of the liver must therefore be at present placed in the same category as other hepatic affections, and await a future time for means of diagnosis.

As regards affections of mucous membranes, I must speak with hesitation: I have been in the habit of brushing over the inside of the stomach and intestines with tincture of iodine, and have occasionally seen some dark points start up, but whether a lardaceous material here existed I could not assert with any positiveness.

As my object is rather to present a clinical report than to speculate on the nature of the disease, I will briefly refer once more, as I did at the commencement, to the more striking facts connected with the disease. In my first published list of thirty-six cases, twenty-seven had some affection of the osseous system, and of the remaining nine, seven were tubercular, leaving only two where the affections above named were not evidently present. In the sixty additional cases which I now give, the same facts appear; two thirds were connected with diseased bone or syphilis, and of the remaining third the majority were tubercular, leaving only five in which there was no history of syphilis, tubercle, or disease of the bone. In the whole ninety-six there are only five which do not come under one of three categories, and perhaps under two, if it could be shown that the bone was affected in all cases of tertiary syphilis.

The three heads are syphilis, tubercular affections, and disease of the bone; the latter arising from syphilis, tubercle, or other cause. If the cases of syphilis be ranked with those of bone, then the latter constitute two thirds of the whole.

CASE 37.—William W—, æt. 9, under Mr. Hilton, July 1856, for disease of hip-joint. He had been in bed eighteen months with purulent discharge in connection with disease of the bone. No tubercle in any part of the body. Lungs healthy. *Liver* lardaceous and fatty. *Spleen* lardaceous.

CASE 38.—Caroline K—, æt. 33, under Dr. Rees, in August, 1856, for phthisis. The liver was fatty. *Spleen* in advanced lardaceous change. *Kidneys* commencing lardaceous change.

CASE 39.—Thomas M—, æt. 14, under Dr. Rees, September, 1856, for albuminuria. The *kidneys* were large, pale, and mottled. The *spleen* was lardaceous.

CASE 40.—Charles H—, æt. 32, under Mr. Birkett, October, 1856, for syphilitic disease of the larynx. There was found, besides the disease of the larynx, a contracting ulcer in the bronchus. Lungs healthy. *Liver*, advanced lardaceous disease.

CASE 41.—Thomas K—, æt. 31, under Dr. Habershon, November, 1856, admitted for phthisis and chronic dysentery. He had had syphilis and been salivated, and also had dysentery in the West Indies. The lungs were the subject of chronic pneumonia, which was in parts breaking down. Bronchial glands large and translucent. The *liver* was lardaceous, and contained numerous abscesses, several of which appeared to be drying up. *Spleen* large and lardaceous.

CASE 42.—Louisa S—, æt. 22, under Dr. Rees, in November, 1856, for phthisis. She struck her chest a year before, and since that had chronic disease in left lung, with pleurisy. *Liver* lardaceous; weight, 4 lb. 13 oz.

CASE 43.—John K—, æt. 22, under Dr. Addison, in December, 1856, for sore on the chest, lumbar abscess, and disease of the spine. Lungs healthy. *Liver* fatty and lardaceous. *Spleen* lardaceous.

CASE 44.—Alfred A—, æt. 44, under Dr. Hughes, in December, 1856, for phthisis of the chronic pneumonic kind. The kidneys were large and mottled. *Spleen* lardaceous.

CASE 45.—Thomas H—, æt. 43, under Dr. Addison, March, 1857. He had drunk hard, had syphilis and enlargement of the bones. He died after paracentesis abdominis. Lungs healthy. *Liver*, 4 lb. 12 oz.; cirrhotic and lardaceous. *Spleen* large, 20 oz. *Kidneys* lardaceous.

CASE 46.—John O. N—, æt. 40, under Dr. Rees, in April, 1857, for phthisis. *Liver*, 5½ lb.; lardaceous. *Spleen*, 22 oz. *Kidneys*, 13 oz.; lardaceous.

CASE 47.—Alexander A—, æt. 39, under Dr. Addison, June, 1857, for phthisis. The *liver* was lardaceous. *Spleen* lardaceous. Intestines excessively ulcerated.

CASE 48.—Elizabeth E—, æt. 10, under Mr. Cock, June, 1857, for necrosis of tibia. Whilst under treatment she took scarlatina, and died of nephritis. The *spleen* was lardaceous.

CASE 49.—William J—, æt. 43, admitted under Dr. Addison, July, 1857, for phthisis. He had syphilis so badly twenty years before, that he lost the whole of the penis; subsequently had ulcers upon him. For seven months suffered from phthisical symptoms. *Liver* lardaceous. *Spleen* lardaceous. *Kidneys* lardaceous.

CASE 50.—Elizabeth S—, æt. 34, admitted under Dr. Addison, July, 1857, for phthisis. *Liver*, weight, 5 lb. 3 oz., lardaceous.

CASE 51.—Michael W—, æt. 19, under Dr. Barlow, October, 1857, for renal dropsy. The kidneys were large, white, and mottled. The *spleen* was an extreme instance of the lardaceous change.

CASE 52.—William B—, æt. 22, under Dr. Barlow, November, 1857, for phthisis. *Liver*, weight 6 lb. 6 oz., lardaceous.

CASE 53.—Emily N—, æt. 22, under Dr. Addison, November, 1857, for general tuberculosis, affecting especially the abdomen. *Spleen* slightly lardaceous.

CASE 54.—Walter B—, æt. 13, under Dr. Hughes, January, 1858, for enlarged liver. He was a remarkably puny child, not being bigger than one five or six years old. He was considered to be slightly scrofulous, or to be the subject of hereditary syphilis. He died of tubercular meningitis. Tubercles were found in the lungs. All the lymphatic glands were much enlarged by tuberculous deposit. *Liver* in extreme degree of lardaceous disease; weight, 5 lb. 3 oz. *Spleen* and *kidneys* healthy.

CASE 55.—Thomas T—, æt. 36, under Dr. Rees, in April, 1858. He was a sailor, and had been in the Dreadnought hospital for three months, suffering from dysentery and general cachexia. He was admitted for pleurisy and peritonitis, of which he died in a few hours. *Liver* lardaceous; weight, 6 lb. 3 oz. *Kidneys* lardaceous.

CASE 56.—Mary Ann C—, æt. 27, admitted, under Dr. Gull, April, 1858. She was in a very cachectic condition, covered with scabs, and having necrosis of the clavicle, all of which were assumed from the woman's character and appearance to be syphilitic. The *liver* contained numerous fibroid nodules. The *spleen* was large and lardaceous. The *kidneys* were also lardaceous.

CASE 57.—Elizabeth P—, æt. 28, under Dr. Rees, in February, 1859. She was a prostitute, and had led a very dissipated life. She had been ill for some time, and died at last from uræmia. The *liver* was lardaceous, and at same time cirrhotic. *Spleen* in extreme degree of lardaceous disease. *Kidneys* also in advanced stage of lardaceous disease.

CASE 58.—James S—, æt. 51, under Dr. Addison, January, 1860, for phthisis and stricture. The lungs were disorganized. *Kidneys* undergoing degeneration and *liver* lardaceous, weighing 7 lb. 1 oz.

CASE 59.—John M—, æt. 32, admitted July, 1860, under Dr. Barlow, for phthisis and renal dropsy. *Liver* fatty. *Kidneys* fatty and lardaceous, and *spleen* lardaceous.

CASE 60.—William G—, æt. 9, under Mr. Cock, December, 1860, for disease of the elbow- and knee-joints. After being under treatment for some months, it was observed that the urine was albuminous, and that dropsy was appearing. The *liver* was lardaceous. *Spleen* lardaceous. *Kidneys* fatty and lardaceous.

CASE 61.—Frederick P—, æt. 20, was under Dr. Wilks in October, 1860. He had been under notice for several years, and was believed to be suffering from the effects of inherited syphilis. He was very diminutive, and had not arrived at puberty; the tibiæ were enlarged; the soft palate was quite destroyed, leaving a large ragged ulcer; the nose was flattened, &c. The liver and spleen could be felt to be enlarged, and the urine was albuminous, so it was believed that he was suffering from lardaceous disease of the viscera. After death the *liver* was found to be very

large and very heavy, being lardaceous throughout. The *spleen* was about four times its usual size, and infiltrated with lardaceous matter. *Kidneys* lardaceous and fatty.

CASE 62.—James S—, æt. 41, under Mr. Forster, April, 1861. He was suffering from syphilitic cachexia; his *tibiæ* were much enlarged. After death his *liver* was found to be cirrhotic as well as lardaceous. The *spleen* was lardaceous, and contained also syphilitic deposit.

CASE 63.—John B—, æt. 33, under Dr. Wilks, July, 1861. He had just arrived from abroad, in a fearfully cachectic state, his legs weakened, and his bones affected with syphilis. *Liver* contained syphilitic deposits, and was also lardaceous. *Spleen* large and lardaceous. *Kidneys* slightly affected by the lardaceous disease.

CASE 64.—George S—, æt. 28, under Dr. Rees, September, 1861, for phthisis. The *liver* and *spleen* were both lardaceous.

CASE 65.—John C—, æt. 29, under Dr. Rees, in March, 1862, for phthisis. The lungs much disorganized, and tuberculous ulceration of intestines. *Liver* lardaceous. *Spleen* lardaceous.

CASE 66.—John D—, æt. 25, under Dr. Gull, May, 1862. In a very cachectic condition; the *tibiæ* diseased, one of them much enlarged. Lungs healthy. *Liver* lardaceous and fatty, but only to a moderate degree. *Spleen* extremely affected, the whole tissue infiltrated with the new material. There were also some opaque white deposits scattered through the organ. *Kidneys* presented an extreme form of the lardaceous disease.

CASE 67.—Mary Ann A—, æt. 22, under Dr. Rees, October, 1862, for albuminuria. The liver was felt to be much enlarged. She had led a very irregular life, and had had syphilis. She died of dropsy and peritonitis. The *liver* was highly lardaceous. *Spleen* not affected, or but slightly; one kidney was almost destroyed by old scrofulous disease. The other kidney was atrophied and granular.

CASE 68.—Sarah N—, æt. 37, admitted, under Mr. Durham, for syphilitic sores and condylomata about the anus. She was in an extremely cachectic state. Death from peritonitis. *Liver* was lardaceous and fatty. *Kidneys* lardaceous.

CASE 69.—Mary Ann C—, æt. 42, under Mr. Poland, for pelvic cellulitis and abscess. She did not live long. There was much old disease and suppuration in the pelvis. *Liver* lardaceous. She showed, as many specimens do, a portion translucent and a part of a pearly-white colour. The latter seemed to be due to a degeneration of the lardaceous substance. *Spleen* lardaceous. *Kidneys* lardaceous, but at same time contained white specks and streaks of fatty matter.

CASE 70.—Rebecca H—, æt. 37, under Dr. Rees, in April, 1863, for diseased liver and kidneys. Both these organs were granular and atrophied. The *spleen* much enlarged, and lardaceous.

CASE 71.—Frederick K—, æt. 24, under Dr. Rees, July, 1863, for dropsy supervening on old hip-joint disease. For years there had been fistulous openings around the hip, and of late dropsy had come on, with albuminous urine. The *kidneys* had undergone the extreme form of lardaceous disease.

CASE 72.—Thomas S—, æt. 50, under Mr. Hilton, December, 1863. He was killed accidentally, but at the time he was suffering from sores on leg, the results of syphilis, and the urine was albuminous. There was found caries of bones of skull, and *tibiæ* were enlarged. *Spleen* lardaceous. *Kidneys* in extreme stage of the disease. Testes contained syphilitic nodules.

CASE 73.—Henry J—, æt. 18, under Mr. Forster, December, 1863, for dis-

organization of elbow-joint and scrofulous sores in other parts. The *liver* was in extreme form of lardaceous disease. The *spleen* was similarly affected, and the *suprarenal capsules* contained some lardaceous substance.

CASE 74.—John J—, æt. 26, under Mr. Forster, in December, 1863, for suppurative disease of hip-joint. He was brother to the above, who was in hospital at same time. The *liver* presented an extreme form of lardaceous disease.

CASE 75.—Thomas S—, æt. 18, under Dr. Gull, February, 1864. He had been in various hospitals during last year or two for anæmia, epistaxis, and dropsy. When admitted into Guy's he had some anasarca, the urine was albuminous; the liver and spleen were enlarged. He died from uræmic cerebral symptoms. The *liver* was affected throughout with the lardaceous disease, and, very remarkably, there appeared to be a free deposit on the surface of the liver, adjoining the diaphragm. The *spleen* was also extremely affected by the same deposit. The *kidneys* were pale and small. They were very firm and wax-like, having undergone the extreme lardaceous degeneration. No change on stomach and intestines when tested by iodine.

CASE 76.—Elizabeth B—, æt. 11, under Dr. Gull, May, 1861, for chronic peritonitis. On post-mortem examination, the intestines were found to be matted together, and amongst the adhesions there were yellow deposits which resembled scrofulous matter. The intestines within were healthy. The mesenteric glands were enlarged and soft, and their interior occupied by soft yellow matter. The *liver* large, and lardaceous throughout. The *spleen* also large and lardaceous. The *kidneys* in early stage of lardaceous disease. Lungs healthy.

CASE 77.—Elizabeth F—, æt. 42, admitted under Mr. Cock, for abscess about hip, on June 23, 1864, afterwards had dropsy and albuminous urine. The *liver* was lardaceous throughout. The *spleen* was also lardaceous. The kidneys small, but not lardaceous.

CASE 78.—Henry G—, æt. 25, under Mr. Cock, July, 1864, for disease of the hip-joint, with suppuration and fistula. The *liver* was partly fatty and partly lardaceous, but uniformly mixed, the interior being mostly lardaceous and the exterior fatty. *Spleen* lardaceous. Neither kidney nor mucous membrane of the stomach and intestines gave any reaction with iodine.

CASE 79.—George W—, æt. 27, under Mr. Birkett, November, 1864, for disease of the hip-joint. This was excised, and the man died soon afterwards of pyæmia. The *liver* contained numerous recent abscesses, and at the same time showed chronic disease of a lardaceous and fatty kind. The organ weighed more than 6 lb. *Spleen* lardaceous. Kidneys unaffected.

CASE 80.—Richard D—, æt. 31, under Dr. Habershon, for disease of the spine; he died of pleurisy. *Liver* very large and lardaceous, reaching to the left side. Weighed nearly 7 lb. *Kidneys* firm and lardaceous. *Spleen* healthy.

CASE 81.—Emily C—, æt. 26, under Dr. Oldham, for scrofulous disease of the kidney, November, 1864. *Spleen* lardaceous. One of the suprarenal capsules contained lardaceous matter. Kidneys quite disorganized. Lungs contained tuberculous matter.

CASE 82.—Henry H—, æt. 42, under Mr. Cock, for compound fracture of leg, for which the limb was amputated on August 10. The stump gradually healed, but the man never left his bed, and gradually sunk into a feeble state, and died at last with

diphtheria, on November 29. Abscess found in leg connected with the bone. The *liver* and *spleen* both showed a commencing lardaceous change.

CASE 83.—George F—, æt. 28, under Mr. Hilton, December, 1864. He entered the hospital for a painful subcutaneous tumour on the finger, which was removed, and subsequently the finger itself. At the same time he had a fistulous opening over the sacrum. He afterwards had vomiting, which became continual and uncontrollable. On post-mortem examination, there was found to be necrosis of the sacrum. The *spleen* was lardaceous. The *kidneys* presented the most extreme form of the disease, for on application of iodine, a discoloration of the whole tissue took place, showing that all the structures were invaded by the lardaceous matter; the Malpighian corpuscles, however, as usual, becoming more prominently marked.

CASE 84.—Harriet C—, æt. 25, admitted under Mr. Forster, for tertiary syphilis, on January, 1864. There was extreme lardaceous disease of all the viscera, including *liver*, *spleen*, and *kidneys*.

CASE 85.—James H—, æt. 31, under Dr. Pavy, February, 1865, for tertiary syphilis. The tibia and forearm were much enlarged, and other symptoms resulting from syphilis, which he had four years before. Urine albuminous. *Liver* weighed 5 lb. and composed of lardaceous and fatty matter combined, the two being distributed pretty equally. The lardaceous matter appeared as a pink translucent material, which was coloured by iodine, whilst the fat was white. The microscope also clearly showed the distinction. The *spleen* was extremely affected by the lardaceous disease. The *kidneys* rather above the usual size, and much affected by the lardaceous change. No marked change in the mucous membrane of stomach and intestines by application of iodine.

CASE 86.—Michael S—, æt. 24, admitted under Dr. Gull, February 1865. He had been very intemperate in his habits, and for two months been suffering from hepatic symptoms and slight jaundice. *Liver* large, heavy, and hard; towards the surface was hobnailed. A section showed it nodulated throughout as in cirrhosis. At the same time there were scattered through it irregular pinkish translucent patches, which, both by the microscope and by the test of iodine, were shown to be lardaceous substance. *Spleen* lardaceous. *Kidneys* commencing lardaceous change, with some fat.

CASE 87.—Henry S—, æt. 31, under Dr. Gull, February, 1865. He was admitted for albuminuria and dropsy. He also had a syphilitic ulcer on the head, and was altogether in a very cachectic condition. The kidneys were affected as in the large white organ described by Bright, and fatty. The testes had undergone a syphilitic fibroid change. *Liver* fatty. *Spleen* lardaceous.

CASE 88.—Eliza B—, æt. 24, under Mr. Poland, February, 1865. This woman had been ill a long time with disease of the tibia. On admission, she was in a cachectic state; her urine was albuminous; and the liver was found to be enlarged, and thus lardaceous disease of the viscera was believed to exist. The post-mortem examination showed necrosis of the tibia. There was pericarditis. The *liver* was very large, weighing 9 lb. 2 oz. It was firm, pale yellow, and felt and looked like a mass of tallow. Lardaceous throughout the whole structure. *Spleen* lardaceous. *Kidneys* firm and lardaceous. Weight 26 oz.

CASE 89.—John N—, æt. 23, under Mr. Birkett, March, 1865, for disease of the hip-joint. It was excised, and the man left his bed, and was doing well, when he fell into a bad state of health, his urine being highly albuminous. The disease of

the hip arose from an injury received in March, 1863 ; he was then a healthy man, but whilst carrying a sack down a plank, he fell, and sprained his left hip. In spite of rest and treatment, suppuration occurred after some months, and the operation of excision was performed. After death, the *liver* was found lardaceous, with some fat. The *spleen* highly lardaceous. *Kidneys* fatty.

CASE 90.—William S—, æt. 32, under Mr. Cock, March, 1865. He was admitted for extravasation of urine, with perineal fistula. There was also a fistulous opening in the groin, communicating with the bowel. There was no *kidney* on the left side, the other was hard and lardaceous. *Liver* healthy.

CASE 91.—Johanna B—, æt. 19, admitted May, 1865, for dropsy, albuminuria, and phthisis. The lungs were much diseased, and tubercles existed in various parts of the body. The *liver* showed commencing lardaceous disease. The *spleen* was extremely affected. The *kidneys* also lardaceous. When the test was applied to stomach and intestines, the mucous membrane in some parts became darker, but there was nothing displayed which was very characteristic.

CASE 92.—Young woman, under Dr. Pavy, died of phthisis, June, 1865. Besides the disorganization of the lungs, the *liver*, *spleen*, and *kidneys* were found lardaceous.

CASE 93.—Edward E—, æt. 21, under Mr. Cock, June, 1865, for disease of hip-joint. There was scrofulous disease of bladder and kidneys. *Liver* lardaceous. *Spleen* lardaceous.

CASE 94.—Emily S—, æt. 34, under Mr. Bryant, June, 1865, for necrosis of the tibia. She died of phthisis after amputation. The *spleen* was lardaceous.

CASE 95.—Catherine W—, æt. 36, under Dr. Barlow, July, 1865, for phthisis and ulceration of intestine. The *spleen* showed an early lardaceous condition. The *kidneys* were also to a slight degree lardaceous.

CASE 96.— — — — under Dr. Barlow. He was admitted July, 1865, for constant sickness. He had only one *kidney*, and that was in an extreme degree lardaceous. The *liver* was lardaceous in an early stage.

CASES OF
ENLARGEMENT OF THE LYMPHATIC
GLANDS AND SPLEEN,
(OR, HODGKIN'S DISEASE,) WITH REMARKS.

BY SAMUEL WILKS, M.D.

HAVING spoken of the lardaceous affection, I must now call attention to a form of disease which in my earlier paper, before alluded to, I treated of in connection with it. I refer to a disease where the lymphatic glands are increased in size, and associated with a deposit of a morbid kind in the internal viscera, more especially in the spleen. Although my own observations were at the time original, I had been forestalled by Dr. Hodgkin, who was the first, as far as I am aware, to call attention to this peculiar form of disease. I believe that the publication of my own paper revived the subject, but in consequence of being referred to in connection with lardaceous disease, I have considered myself to have been partly the cause of the two affections being confounded. It is for this reason that I make this personal allusion to myself, and, at the same time, take the opportunity of endeavouring to remove the subject from the false position in which it has been placed. I will not say that the cases described by Hodgkin may not have certain affinities with the lardaceous disease, but there is sufficient peculiarity in them to warrant them standing alone, and without any support from another affection. A perusal of the original cases, or, what is better, an examination of his specimens on our shelves, will show that the disease is not to be confounded

with the lardaceous or any other morbid process. The title of Dr. Hodgkin's paper, which was read before the Medical and Chirurgical Society in January, 1832, and is to be found in vol. xvii of the 'Transactions,' is, "On some Morbid Appearances of the Absorbent Glands and Spleen," and in which he describes cases where the glands were enormously enlarged, and the spleen contained a white deposit like suet, scattered through it.

It is true that enlarged glands may be met with in various forms of disease, and sometimes with the lardaceous, and thus the two affections may have relationship; they would appear, also, to have a likeness to tubercle on the one hand, and cancer on the other. It is, however, as much a disease *sui generis* as any other, and deserves a description of its own. Dr. Hodgkin may himself have been the cause of some confusion, since out of his six cases probably four only are examples of the disease; one is doubtful, and the other is evidently a syphilitic affection.

The disease is mainly characterised, as the author described, by an enormous enlargement of the lymphatic glands throughout the body, with a peculiar white deposit in the spleen; but, as he himself mentions in one case, the liver may contain similar deposits, and of late these have been shown even in the other viscera.

In the paper referred to, Dr. Hodgkin prefaces his cases by saying:—"The morbid alterations of structure which I am about to describe are probably familiar to many practical morbid anatomists, since they can scarcely have failed to have fallen under their observation in the course of cadaveric inspection. They have not, so far as I am aware, been made the subject of special attention, on which account I am induced to bring forward a few cases in which they have occurred to myself."

CASE 1.—The first case which he proceeds to describe is that of a boy, æt. 9, who died of dropsy and peritonitis. The absorbent glands were in many places greatly enlarged. In the mesentery some were as large as pigeons' eggs, and there was a continuous chain of these enlarged and indurated glands along the aorta and the iliac vessels. The bronchial were also enlarged. There were a few tubercles in the lungs. The spleen was large, and contained numerous tubercles. The substance of the liver was generally natural, but contained a few tubercles, somewhat larger than peas, white, semi-cartilaginous, and of an uneven surface. The lumbar glands are seen at Prep. 1558, and are very large, firm, and of a white colour. The spleen is seen at 2009, containing numerous white masses, of various sizes, like suet.

CASE 2.—Dr. Hodgkin's second case is that of a boy, who was admitted into the hospital with enlarged glands in the neck, and with enlarged spleen. He died of general anasarca. On post-mortem examination, the glands in the neck were found to have assumed the form of large, smooth, ovoid masses, connected together by loose cellular tissue of a light colour and firm cartilaginous structure, and showing no appearance of softening or suppuration. The bronchial and mediastinal glands were similarly affected. The mesenteric glands were in the same state as the glands in the neck. The lungs were healthy, and liver healthy. The spleen was four times its natural size, and its structure thickly sprinkled with tubercles. The lymphatic cervical glands are seen at Prep. 1541¹³, and are large, pale, and firm. The spleen is seen at 2009⁵⁰, and is full of a firm opaque deposit, occupying nearly all the organ.

The third case admits an element of discord, inasmuch as it probably represents another form of disease. It is said that the glands were not enlarged, and the spleen did not contain the white deposits, but some translucent matter. The liver contained some hard nodules, and was shrunken and of irregular shape. The patient was thirty years of age, and died of cachexia resulting from syphilis and mercury. The Prep. of spleen is preserved in the museum, No. 2005⁵⁰, and is a good specimen of the lardaceous affection. The liver is probably affected by syphilitic nodules.

CASE 3.—The fourth case is a good example of the disease. The man was æt. 50, and admitted for immense enlargement of the absorbent glands in the neck, axilla, and groin. Many of them were the size of eggs, though their size differed. They had a smooth rounded figure. The spleen could not be felt. He died rather suddenly. The glands when examined were found to be firm, and of a white colour. The alteration seemed to consist of a morbid hypertrophy of the glandular structure rather than of a new adventitious growth. Besides those before mentioned, the glands were found immensely enlarged in the lumbar region, mediastinal, and bronchial. The mesenteric were only slightly affected. The lungs were healthy, the liver healthy, the spleen was greatly enlarged. On cutting it an almost infinite number of small, white, nearly opaque spots were seen pervading its substance, of an irregular figure, but a few appeared nearly circular. The Prep. of the glands are numbered 1538⁵⁰, 1555²⁹, 1558⁵⁰, and afford examples of this peculiar disease.

The fifth case is not given with an accuracy sufficient to distinguish its character. The liver and spleen are said to be large, and probably are lardaceous.

CASE 4.—The sixth case affords a good example of the disease. A man about 50, was admitted with large glandular tumours in the neck, axilla, and groin, which had been growing about two years. On the post-mortem examination, simi-

larly enlarged glands were found in the mediastinum, and extending throughout the abdomen in the lumbar and iliac regions. Some of these were as large as hens' eggs, the texture was uniform throughout, and showed no disposition to suppurate or soften. The spleen appeared, very remarkably, to contain no deposit. The liver was small, with an irregular uneven surface, and contained two or three white tubercles. The Prep. seen at 1543³², 1543⁶⁴, 1858³⁰, afford excellent examples of the disease.

After describing these four cases of this peculiar affection Dr. Hodgkin relates the history of a case given to him by Dr. Carswell, which was styled "cancer cerebriformis of the lymphatic vessels and of the spleen." The case occurred at the Hospital St. Louis, under M. Lugol. The man had enormously enlarged glands in the neck, and throughout the body internally, as well as large deposits in the spleen. Dr. Hodgkin says, "Although the doctor has employed the term *cerebriform* matter, which conveys a ready idea of the texture of the diseased glands, he will excuse my differing from him so far as to regard the affection in this case as distinct from cerebriform cancer. I feel the less difficulty in doing so, in the recollection that one of the cases of which I had given the details, was, like Dr. Carswell's, considered as fungoid, until a special and close inspection had detected the difference."

Dr. Hodgkin goes on to remark that, as far as can be ascertained, this enlargement of the glands appears to be a primitive affection of these bodies, and there is no reason to suppose it is due to inflammation or scrofula, nor indeed attributable to the formation of any adventitious structure. It appears, in nearly all cases, to consist of a pretty uniform texture throughout, and this to be the consequence of a general increase of every part of the gland, than of a new structure developed in it. In conjunction with this affection of the absorbent glands is the state of the spleen, which is thickly pervaded by defined bodies. We might suspect that the bodies in the spleen, like the enlarged glands, were due to an enlargement of a pre-existing structure, an idea which may derive some support from the fact that, although in the human spleen no glandular structure is distinguishable, in those of some inferior animals a multitude of minute bodies exist, which appear to be of that nature. Malpighi, indeed, considered the acini to be glands.

In the 'Guy's Hospital Reports' for the year 1856, I recount

the details of some cases of Hodgkin's disease, of which the following is an outline.

CASE 5.—William K—, æt. 37, in the hospital under Dr. Hughes, in 1856. He was a ship's steward, and just arrived in England. He was in a typhoid state, and shortly died. The *lymphatic glands* throughout the body were immensely enlarged, including the bronchial, lumbar, and mesenteric. The *spleen* was large, and had in its interior a quantity of soft matter like pus, and around this, and infiltrating the organ, large masses of a white substance like hardened tallow, and very small white patches like tubercle. The *liver* contained a number of yellow deposits about the size of a pin's head. The microscope showed not only ill-formed cells like those of tubercle, but nuclei and fibroid tissue.

CASE 6.—Louis P—, æt. 24, admitted, under Dr. Hughes, in 1856. He was in an extremely anæmic and debilitated state, but no marked organic change could be detected, except an enlargement of the spleen. After death, the lymphatic glands were found to be very much enlarged, but only those within the body, as the mediastinal and lumbar, and thus there was no external evidence of the glandular disease. The *spleen* was large, and occupied by opaque white deposits.

The next case which I give is quoted from the 'Transactions of the Pathological Society,' as there described by Markham. The man had very enlarged glands, and the spleen contained straw-coloured masses.

CASE 7.—In the 'Guy's Hospital Reports' for 1859, and 'Jour. of Path. Soc.,' vol. x, I reported the following:—Henry S—, æt. 18, admitted into the hospital, under Dr. Pavy, for an extreme anæmia and anasarca. An immense mass of enlarged glands existed in the neck, and the spleen was felt enlarged. The blood did not contain any excess of white corpuscles. The post-mortem showed the mediastinal and lumbar glands to be of immense size, like the external ones. They were tough and fibrous, and appeared as if the gland-structure had disappeared. The *spleen* was enlarged, and had a number of white deposits scattered through it. The *kidneys* showed some similar deposit. The *liver* contained some small specks of disease, which were firm and of fibro-cellular nature.

CASE 8.—The same volume of the 'Guy's Hospital Reports' also contains the following:—William B—, æt. 27, was admitted in an extreme state of anæmia and feebleness. In the left groin the glands were enormously enlarged. The spleen could also be felt. The glands had been observed to be enlarged for three and a half years. On post-mortem examination there was universal anasarca. There was no marked excess of white globules in the blood. The *spleen* was filled with a number of white masses, so that at least half of its substance was filled with this material, as if half-filled with suet, and apparently occupying the site of the Malpighian corpuscles. The lymphatic glands were enlarged throughout the abdomen, were soft and translucent, and by the microscope showed a cell-structure which was not distinguishable from the true tissue. Others contained a fibrous material, and others some soft yellow decaying substance.

CASE 9.—I also published in the 'Trans. of the Path. Soc.,' vol. xi, the follow-

ing:—L. W—, æt. 10, under Dr. Rees, in 1859. He had been very anæmic for many months, and had enlarged lymphatic glands on the right side of the neck. The post-mortem examination showed the cervical glands to be contiguous with similarly enlarged glands in the mediastinum and around the bronchi. The latter had compressed the right bronchus, and, on opening the tubes, they could be seen to be slightly protruding in one or two places into the interior. The lungs contained two independent deposits. The liver had a number of minute white specks, which consisted of new material in the course of Glisson's capsule, but there was a large one, the size of a nut, which appeared to consist of nucleated tissue. The spleen was occupied to about half its extent by white masses like suet. The kidneys contained a few small deposits in their interstitial structure.

CASE 10.—In vol. xiii of the same work I have also described a case. H. G—, æt. 29, who had been suffering from anæmic symptoms for three or four years, the cause of which was not discoverable, but he had slight enlargement of the cervical glands, which suggested the probable nature of the case. He died at last of exhaustion. The post-mortem examination showed the lungs full of miliary tubercles, or what appeared like them. Glands enlarged in the mediastinum and in lumbar region. The liver contained a number of white or yellowish-white deposits scattered through the organ. They ran in the course of Glisson's capsule (see plate in above-named volume). The kidneys contained some deposit of a like nature. The spleen appeared healthy.

Since the publication of the foregoing the following cases have occurred in the practice of the hospital :

CASE 11.—Robert S—, æt. 24, under Dr. Gull, May, 1860. He was brought to the hospital in a scarcely conscious state, so that no history was obtainable, and the case was involved in the greatest obscurity. He lay with his eyes closed, and was scarcely sensible, somewhat resembling a patient with fever. The spleen could be felt below the ribs, and this suggested an intermittent fever, but the man appeared too ill for this. He lay in a semi-conscious state for a week, when he died. Post-mortem examination : brain carefully examined, but nothing abnormal found. Lungs somewhat œdematous, otherwise healthy. The *bronchial and mediastinal glands* were much enlarged; a section showed them to appear as simply hypertrophied glands, but the microscope showed masses of cells and fibres as of new tissue. In the neck there was a large mass of enlarged glands of the same kind. The glands in abdomen, the lumbar, and those around the stomach were enlarged. The *liver* was structurally healthy, but there were scattered through it small white deposits. These were firm and composed of fibro-nucleated tissue. The *spleen* was enlarged and full of white masses or deposit resembling suet. They corresponded, apparently, to the Malpighian corpuscles. Kidneys healthy.

CASE 12.—Sarah P—, æt. 13, under Dr. Gull, February 13, 1864. Her parents were dead, and she had consequently been very badly fed. She was one of thirteen children, five of whom died when young. She was well until eighteen months before admission, when the glands of the neck began to swell, and since that time she has gradually been losing strength. She had a pale or pasty look, the conjunctivæ pearly, with a dark areola around eye; abdomen large and tympanitic. The spleen to be felt enlarged. Urine not albuminous, and no excess of white globules

in the blood. The lungs healthy. Cervical *glands* much enlarged; when cut through were firm, and had a translucent appearance, but scattered through them was a white deposit of a somewhat firmer consistence. Some of the bronchial glands were similarly affected. The gastric and lumbar glands were also enlarged in the same way. The *liver* was occupied throughout its substance by an adventitious deposit, about a fourth or even a third of its whole volume being affected. It was white, very firm, and appeared fibrous on scraping it, and gave out no juice on pressure. The deposit appeared to have occurred in Glisson's capsule, and to be running in the course of the portal vessels, and surrounding them. The *spleen* was much enlarged, and full of a white deposit, which in outward appearance resembled yellow scrofulous matter. In some places the deposit was more translucent, resembling the section of the lymphatic glands. Kidneys healthy.

CASE 13.—Susan P—, æt. 29, admitted under Dr. Gull, November, 1864, and died the same week. The body was spare, the legs œdematous. The *lymphatic glands* throughout the body were much enlarged, especially the bronchial, posterior mediastinal, and lumbar. The appearance of the glands was as if merely hypertrophied, showing a tough translucent structure. In one or two there was a small opaque deposit. This was especially the case in the mesentery. The *spleen* was large, and filled with yellowish-white deposit, like masses of suet scattered through it. They were the size of peas, or smaller, they were not rounded like tubercle, but of irregular shape. The *kidney* contained masses of deposit like the spleen. These were irregularly scattered through it, and were of various forms, most of them being of lengthened shape, and running downwards through the cortical substance. The *lungs* were occupied by scattered deposits of tubercle, or what appeared to be tubercles. Some of them were small and hard, but most of them were yellow and soft, resembling the yellow scrofulous matter. They had, however, an appearance which the eye at once declared was not that of ordinary tubercle, and resembled indeed the deposit above spoken of as occurring in the kidneys and spleen. Liver healthy.

CASE 14.—In the 'Guy's Hospital Reports' for 1856 the following case will be found, where the enlargement of the lymphatic glands is associated with lardaceous disease.

John L—, æt. 23, under Dr. Gull, for enlarged lymphatic glands and enlarged liver. The post-mortem examination showed the lymphatic glands, especially the lumbar and inguinal to be immensely enlarged, and having a transparent gelatinous appearance. The liver was of immense size, and lardaceous. The spleen was also lardaceous.

In the 'Guy's Hospital Reports' I have also published the following:—J. L—, æt. 52, under Dr. Addison. Came into hospital with an enlarged spleen and leucocythæmia; the red and white corpuscles of the blood appearing in about equal proportions. After death, the spleen was found to be much enlarged. The lymphatic glands in the lumbar region, as well as those in the mediastinum and axilla, were much enlarged.

The following case is that of a gentleman who consulted many physicians in London, and is now probably deceased.

CASE 16.—Mr. K—, æt. 34, was seen by me September, 1863. About two years

before, his friends observed that he did not look well, was pale and sallow, although he did not feel ill himself. About nine months ago he discovered some enlarged glands in the neck, and on further observation, found some in axilla and groin. These have only slightly enlarged since. He soon afterwards began to feel weak; the weakness has increased, so that during the last few months he has not been able to walk far, nor to run up stairs. His legs, he said, often tottered under him from mere feebleness. He had been in the country, but had not improved; he had lost sexual appetite; had no diarrhoea nor any urinary symptoms. He had somewhat lost flesh. He was of moderate height, spare, and has a marked anæmic appearance. Skin pale, except that of face, which was sallow; sclerotic pale; pulse feeble; heart and lungs healthy. Liver not palpable. Spleen could be felt descending below the ribs. Urine slightly opaque on boiling and application of nitric acid. The blood by microscope showed the existence of leucocythæmia, there being nearly as many white corpuscles as red, at least a third part consisted of the white. He had taken all the usual tonic remedies without effect.

A perusal of these cases will show that here is an affection presenting as striking peculiarities as any in the nosology, and deserving a distinct appellation. In connection with cases formerly published I made the following observations:—"It is an affection first observed by Dr. Hodgkin, who described it as a peculiar enlargement of the absorbent glands with a deposit in the spleen. These are its main features, although accompanied in life-time by a remarkable anæmia and disposition to anasarca. In the last few cases which I have observed, the new adventitious material which has caused the enlargement of the glands and the deposit in the spleen has also been found in the liver and kidney, and sometimes in the lungs. It would appear, then, that this disease represents merely one mode in which an adventitious deposit can affect the organs, and that it must take its place in the rank of malignant diseases, or amongst those affections which are characterised by the development of new growths in the system. The peculiarity of this affection still remains in the fact of the glandular system being especially affected, and which gives rise, therefore, to peculiar symptoms. This may be due to the lymphatic glands being first diseased, for it has not yet been determined, in this class of maladies, how far the constitutional and how far the local causes predominate in causing the propagation of, and in giving the character to, new growth. In the present form of disease the lymphatic glands appear to be affected for a considerable period, perhaps many years, before the system suffers, and that next the spleen becomes especially involved, and after-

wards the other organs ; it is possible, too, that the propagation takes place in the course of the lymphatics, and the reason why the corpuscles of the spleen are thus affected arises from the fact of their being intimately connected with the absorbent system, and in like manner the deposit in Glisson's capsule of the liver may have been transmitted by the same channels. As regards its degree of malignancy it appears to take a place between cancer and tubercle ; the growth in the glands, with implication of the bronchial tube and pulmonary tissue, resembling the former, whilst the mode of deposit in the splenic corpuscles and along the minute vessels of the portal system of the liver resembles tubercle. Moreover, there is the fact that the deposit in the lungs in some of these cases would, under other circumstances, be styled tubercle. It might be as a mere conjectural hypothesis that the subject of the disease is scrofulous, and that the enlargement of the glands commences by an albuminous exudation, &c. ; but then, instead of degenerating, takes a more active course as a corpuscular or fibrous growth, and thus represents another phase of tubercle, though still retaining a strong alliance with it."

It is an interesting question to determine the exact nature of the adventitious material. The lymphatic glands are large, firm, and translucent ; the microscope showing an abundance of cells scarcely distinguishable from the normal secreting bodies, and with more or less fibre-tissue. In the liver the material is much tougher and fibro-nucleated ; whilst in the lungs, spleen, and kidneys, it is composed mostly of cells which resemble somewhat those of tubercle.

What then is the nature of the disease, and, first, what is the change in the lymphatic glands ? If it be of the kind which Hodgkin surmised we have before us a case of hypertrophy of the lymphatic system, and a disease analogous to what we meet with in the spleen. A most remarkable disorder ! in which an interruption to the healthy action of the body is induced by the excessive function of one set of organs. Just as the balance of functions is lost by an excess of splenic action in the case of hypertrophy of the spleen, so here also it is lost by an over lymphatic action. It is believed that both spleen and lymphatic glands are involved in the blood-making process, and thus that a leucocythæmia may be produced by

disease of these organs ; the two conditions of blood being distinguishable by the different sizes of the superabundant white corpuscles. According to my own experience I have never met with well marked leucocythæmia in Hodgkin's disease, and thus I have always preferred the term anæmia to leucocythæmia lymphatica.

On the contrary, does the new cell-formation interfere with the function of the gland, and is the latter therefore destroyed instead of being increased? Instead of the life of the patient gradually ceasing from an excess of function of a set of organs, is it not rather through their diminution or cessation of action? It might be thought that in our present knowledge of physiology and pathology, to say nothing of anatomy, it were impossible that such a question, as to whether an organ is anatomically and physiologically hypertrophied or atrophied, should ever be put, much less be incapable of being answered; but, from the writings on the subject, it is evident that ignorance is still predominant. The fact of a new deposit of a fibro-cellular character existing in other organs, might tend to the opinion that the material in the glands was altogether adventitious. If so, there would be good reason for the existence of blood disease, and also, perhaps, why there should be no excess of white globules.

It is possible that there may be such a condition as a simple hypertrophy of the gland, as well as that where it is occupied by an adventitious material; or, indeed, that an affection commencing as the former might terminate as the latter. It is possible, also, that there may be a third affection, in which the adventitious material is of a lardaceous character, and thus the lymphatic enlargement and the lardaceous disease have been regarded as identical. I have seen but one case where these two conditions were associated, and it is possible that the enlargement was not of the kind which is at present under notice, especially as the usual deposit in the spleen or other organs, was altogether absent. I have already said that I have failed to find the excess of white corpuscles, except in Case 15, and here the spleen was hypertrophied. In Case 16, also, leucocythæmia existed, here also the spleen could be felt enlarged, but what was the nature of the enlargement I could not say.

Is the disease one which especially affects the lymphatic system? There is no doubt that death ensues through the derangement of the glands, as the viscera are but comparatively involved. It may be surmised that the disease affecting the splenic corpuscles is owing to their connection with the lymphatic system. A similar conjecture might be made with reference to the other organs, that the affection is propagated through them in connection with the same structures.

Whether the disease be a constitutional one, or whether the system be infected from a local source, is a question to be answered only in connection with numerous other maladies, as cancer, lardaceous disease, pyæmia, &c. The generally accepted doctrine has been, that an affection like the present must be constitutional; but modern research would quite approve of a theory which should make it commence in one part of the lymphatic system, and from this, as a source of contamination, be propagated through the body.

I have already said, that it is highly important to discriminate in various diseases and morbid processes, so as to ascertain the class of subjects in which they occur, and to study their own special pathology. In this way, this disease of Hodgkin is clearly separable from lardaceous disease, from cancer and tubercle, although all these affections may bear a relation to one another. The connection with lardaceous disease may or may not exist, if so, there is the case, No. 14, to support it. Its association with tubercle is seen in the class of organs and the tissues affected, and even by the presence of deposit in the lungs, which may in fact be real tubercle. Its likeness to cancer is seen in the fact of its diffusion through the body, its mode of propagation through the liver (Case 12), and, moreover, by such a case as that described (Case 9), where the enlarged glands were growing into and encroaching on the bronchus. A new growth, it may be observed, which thus destroys surrounding parts, is usually styled malignant.

It will be seen, that of the fifteen cases here given, how remarkably alike were the features in all; consisting of an enlargement of the lymphatic glands, with a peculiar deposit in the organs, and more especially the spleen. Amongst these cases there were two where there was no affection of the spleen, one where the organ was hypertrophied, and one in

which it was lardaceous. In the remaining thirteen cases, the disease was of a remarkably uniform character, and quite deserving of a special name; all the cases which I have described having come under my own eye, and resembling in all particulars the first four, which Dr. Hodgkin so many years ago brought under the notice of the profession.

CLINICAL REPORT

ON

THE DISEASES OF THE TESTICLE.

By THOMAS BRYANT.

CHAPTER I.

ON HYDROCELE.

HYDROCELE, or a collection of fluid in close connection with the testicle or spermatic cord, is a term which surgeons have been in the habit of applying to two very different classes of cases—to cases which differ in their progress as well as their pathology, agreeing only in the one marked and prominent symptom to which the term hydrocele has been applied. For clinical purposes this comprehensive word may perhaps have certain advantages, and with this view it may still be employed, although in a scientific sense it is certainly to be condemned.

Accepting the term hydrocele, therefore, as signifying a collection of fluid in close contact with the testicle or spermatic cord, two great divisions of the subject at once suggest themselves; namely, hydrocele in some portion of the tunica vaginalis, either of the cord or testicle, and hydrocele as represented by an expanded and newly-formed cyst, this cyst being as a rule in connection with the epididymis, and but rarely with the body of the testis; the term *vaginal* hydrocele being applied to the former class of cases, and *encysted* to the latter.

On Vaginal Hydrocele of the Cord and Testicle.

I have thought it right, as tending to a clearer understanding of this disease, to consider simple vaginal hydrocele of the cord and testicle under one heading, for the pathology of both classes of cases is identical, and the principles of their treatment are much the same.

They are both produced by a collection of serous fluid within some portion of the tubular prolongation or sac of the tunica vaginalis; the terms hydrocele of the cord or of the testicle being applied to one pathological condition as it affects two different portions of the same serous membrane.

For a better understanding of this subject a few words concerning the formation of the canal, or serous sac, into which this serous fluid is poured, may perhaps prove acceptable.

On the Formation or Development of the Serous Sac into which the fluid of a simple Vaginal Hydrocele of the Cord or Testicle is effused.

It is well known by all physiologists that the testicle in its descent from the loin during foetal life draws with it into the scrotum two layers of peritoneum, both passing through the internal and external abdominal rings in front of the cord and its attendant nerves and vessels, both also passing into the scrotum, the posterior layer being in close connection with the fibrous capsule of the body of the testicle—the tunica albuginea—and the anterior in connection with the purse or scrotum.

In a perfectly normal condition it is generally supposed that at birth, or shortly after, the two surfaces of these serous membranes close and become connected, the canal which was at one time present ceasing to exist, and becoming a closed and withered channel, from the internal abdominal ring to the upper portion of the testicle. In the scrotum, however, the two serous surfaces are supposed to be permanently free, for the purpose of allowing easy and ready mobility of the testicles in their serotal covering.

That the latter part of this supposition is correct there is

little room to doubt, for all anatomical and pathological investigations tend to show that such is really the case ; but it is not so clear that the former hypothesis is equally true, for it has been ascertained that the prolongation of the serous membrane down the inguinal canal and into the scrotal sac remains patent for a longer period than has been generally supposed, and that in some cases it continues more or less as a pervious canal during the whole of life. I would more particularly allude to the investigations of Mr. Birkett on the subject of hernia to confirm the truth of the above remarks, for he has demonstrated the fact, that in a large proportion of the examples of scrotal hernia the bowel descends into the open vaginal and scrotal process of the peritoneum which passes down to and covers the testicle.

The following anatomical facts in connection with this subject may, then, with some confidence be laid down :

That the opening into the peritoneal cavity at the internal ring is frequently open at birth and during the whole of adult life.

That the vaginal process of the peritoneum may remain as a more or less open canal during childhood, and even up to old age ; and that this tube may extend partially or wholly through the inguinal canal, and even into the scrotal vaginal sac.

That this naturally formed peritoneal tube and sac may be closed at the internal or external abdominal rings, or at any intermediate spot between these points, or at its junction with the testis.

As a consequence, it is tolerably clear that a collection of serous fluid may take place in any part of this prolonged serous channel, and that a hydrocele of the cord or testis of different kinds may be produced.

We thus find, during infant and early life, that a serous exudation may take place into the scrotal portion of this peritoneal sac, which is in direct communication with the abdominal cavity, from a want of closure at the internal ring or at some other part of its course. To these cases the term *congenital hydrocele* has been applied. In others, the serous effusion may be arrested at the external ring or at the upper portion of the testis, when a *congenital hydrocele of the cord* is said to exist. At early as well as late periods of life the

serous effusion may be confined to the scrotum, and may not extend higher than the external ring, this being the ordinary condition of *simple vaginal hydrocele*; in other instances, however, it may extend more or less up the canal, even as far as the internal ring.

In another class of cases the serous fluid may be confined between the internal and external rings, giving rise to the so-called *diffused hydrocele of the cord*; and when it occupies a still more restricted space, it is usually described as an *encysted hydrocele of the same part*.

The pathology of all these different conditions remains, however, the same, these differences in position being accidentally determined by the extent and lines of adhesion or by closure of the peritoneal testicular prolongations.

The Pathology of Hydrocele.

As a general rule, it may with considerable confidence be asserted that the secretion of the serous fluid which gives rise to the ordinary vaginal hydrocele is due to some inflammatory affection of the serous membrane; for in certain cases pure flocculi of lymph may be seen floating in the secretion, and in others spontaneous coagulation of the same may occasionally be observed. The thickening of the tunica vaginalis, which so frequently takes place in cases of long standing, and the presence of membranous bands and septa in the cavity of the same serous sac, points likewise to the same conclusion. This opinion gains support also from the fact that this form of hydrocele may be produced by extension of the inflammatory action from some portion of the epididymis or of the body of the testicle.

In another, although a smaller class of cases, it is not, however, so clear that an inflammatory action has any influence in the production of the serous effusion, for it would rather appear as if in these instances the exudation was of a passive nature, being merely an excess of the natural secretion of the serous membrane. It is to the congenital form of hydrocele that these observations are more particularly applicable, to that in which a communication still exists between the abdominal

peritoneal cavity and the scrotal serous sac ; for it is certainly true that in many of these cases the fluid rapidly disappears under tonic treatment, the passive effusion being reabsorbed as the powers of the patient improve, and *vice versa*.

Nature of the Fluid.

The fluid of a vaginal hydrocele is invariably albuminous, for the secretion of all serous membranes contains albumen in solution, and under the influence of an inflammatory action, this albuminous nature is markedly increased ; hence the amount of albumen in the fluid of a hydrocele is determined by the nature and violence of the inflammatory action. We thus in some cases, as in the congenital variety, find it as a thin, serous, and saline fluid, slightly tenacious and albuminous, and of a clear colour, the fluid varying in no single point from the natural serous fluid of the peritoneal cavity.

In others, again, it appears of a more tenacious character, varying in hue from a pale amber to a deep straw ; in some examples it will be stained with blood, in others it may hold cholesterine in suspension, at times being perfectly opaque and syrupy from the presence of such matters. It is, however, in the old and chronic cases only that these last conditions are to be observed.

In the so-called *acute vaginal hydrocele* more or less fibrin will invariably be found either in solution or in the form of false membrane or adhesions between the two surfaces of the serous membrane ; and in *the chronic* examples the walls of the cyst will be found to have undergone great changes, the thin clear membrane becoming thick and opaque, from the organization of the inflammatory product poured out into its tissue ; while upon its surface this membrane presents a firm fibrous appearance, and in certain cases contains cartilaginous or ossific deposits. In rare cases suppuration has been observed to occur in the tunica vaginalis, but this result is beyond my experience, unless as the effect of some external irritation or plan of treatment which has been adopted for its cure.

Symptoms and Diagnosis of Vaginal Hydrocele of the Testicle.

Uncomplicated hydrocele, or a simple effusion into the tunica vaginalis, unassociated with any disease of the testis or epididymis, is generally a painless and insidious affection; it attracts attention mainly by its size, and demands treatment chiefly from the mechanical inconvenience it causes.

It is generally of slow progress, and, as a rule, will be found to have existed for many months when coming under the notice of the surgeon; the patient seeking advice only when the organ has become cumbersome, and from its weight has excited some pain and dragging in the lumbar region.

The Clinical Examination of a Hydrocele.

On examining a testicle, the seat of this disease, the enlargement will be found occupying the position of the testicle which will apparently have become part of the affection; it will be found also free and readily moveable. On inquiring into the history of the case, it will be learnt that the swelling appeared primarily in connection with the testis, gradually encroaching upon the upper portion of the scrotum towards the external ring, and on careful examination the cord will generally be distinguished above the tumour clear and distinct. In exceptional cases, however, it should be observed, the fluid will be found to pass upwards through the external ring, and up the cord as far as the internal ring; in such examples it is tolerably clear that the peritoneal testicular process has been closed only at one point, and that is at its internal abdominal opening. On taking the tumour in the hand it will be found to be light, and on passing the fingers over its surface it will be felt smooth and uniform. Fluctuation will also readily be detected on the slightest and most delicate palpation. The position of the testicle should then be looked for and made out; its natural site being somewhat posterior, and in large tumours towards their upper part. But it must be borne in mind that, in certain examples, the testicle may be in front of or below the tumour; that is, in cases in which the organ is inverted. The best test of its presence is afforded by manipulation; the peculiar testicular pain felt on the application of pressure, affording a certain indication.

The question of translucency should next demand the notice of the surgeon, for when present it is of peculiar importance, as indicative of the vaginal hydrocele; but it must be remembered that it is not an invariable symptom; for it is neither present in cases of hydrocele in which the fluid is thick, bloody, or opaque, nor when the walls of the vaginal tumour have become thickened by fibrinous deposit.

It should be added that for this translucency to be well observed, the integuments of the scrotum should be firmly stretched over the scrotal enlargement.

The tumour is generally described as being of a regular and pyramidal shape, but this condition is very variable, for the shape of the swelling depends upon the openness of the tubular peritoneal membrane of the cord, and the connection which exists between the surfaces of the tunica vaginalis testis, and tunica vaginalis scroti. When the canal has closed and withered down to the body of the testis, the swelling will be more or less globular; and the higher the point of closure of the vaginal peritoneal sac towards the internal ring, the more pyramidal will the watery swelling necessarily become. Should adhesions exist between the two layers of serous membrane at the lower portion of the testis, the hydrocele will appear to be at the upper portion of the testis; and should bands of adhesion exist between the two surfaces, an irregular or even hour-glass contraction may make its appearance—the outline of a hydrocele depending much upon the anatomical conditions of the part in which it is situated, and the pathological changes which may have resulted from the affection.

The true pyramidal swelling is best seen in children, when the fluid will be found frequently to pass well up the cord. In adults it is certainly far from common. In the following case the true pyramidal shape was well seen.

Hydrocele of Testis passing up to Internal Ring.

CASE 1.—John R—, aged 9 weeks, was brought to me, September 26th, 1864, with a remarkably tense hydrocele of the right testis, the size of an egg, of one week's duration; it passed upwards through the external ring, filling the inguinal canal to the internal ring, and even through it, no line of separation

being felt, the tumour having no neck. Tonics and cold lotions were employed, and a cure resulted in three weeks.

The Ages at which this Disease usually appears.

Hydrocele occurs at all ages, but it is somewhat common at birth and middle age, and the following analysis of my own cases well bears out the investigations of Curling and others on this subject :

			When coming under observation.			When the disease first appeared.		
Under 15 years of age			3 cases, or 2·4 per cent.			10* cases, or 9 per cent.		
Between 16 and 20	„		9	„	7·25	„	11	„ 10 „
„ 21 „ 30	„		31	„	25·	„	27	„ 24·8 „
„ 31 „ 40	„		26	„	20·9	„	23	„ 21·1 „
„ 41 „ 50	„		22	„	17·7	„	18	„ 16·5 „
„ 51 „ 60	„		18	„	14·5	„	17	„ 16·6 „
„ 61 „ 70	„		18	„	10·4	„	3	„ 2·7 „
„ 71 „ 80	„		2		—	„	15	„ Not stated.
			<hr/> 124			<hr/> 124		

* 5 of which were congenital.

In the largest proportion of cases, hydrocele appears as a single affection, but it seems to affect the right or left testis indiscriminately. Curling tells us that of 115 cases, 65 occurred on the right, 44 on the left, and 6 were double; whilst of my own 117 cases in which these facts were noted, 41 occurred on the right side, 62 on the left, and 14 were double, and these results coincide with the opinions of Velpeau, Gerdy, and others.

By way of summary it may be said a chronic vaginal hydrocele appears as a painless swelling, and as an apparent enlargement of the testicle, of slow and unequal growth, and of variable size, with a smooth and uniform surface, and more or less tense and fluctuating feel; it is invariably moveable within the scrotum, and, as a rule, it can be clearly demonstrated to be distinct from any abdominal connections. The presence of the testis can generally be made out at its posterior and upper portion by the testicular pain on pressure; or by the absence of translucency at one spot—the tumour, as a rule, transmitting light when its scrotal coverings have been well stretched. It has a tendency to remain tranquil for many years, and by age simply

increases in size, occasionally growing to enormous dimensions, the penis becoming buried at times within the swelling; it never proves dangerous to life, and causes pain and requires treatment mainly from mechanical causes.

Symptoms and Diagnosis of Hydrocele of the Cord.

It has been already briefly explained how a hydrocele of the cord may be produced, and under what circumstances it may appear as a *diffused* or as a so-called *encysted* tumour. It has likewise been shown how these two conditions are but modifications of the same disease, the diffuseness or isolation of the affections being determined by the adhesion, or more or less complete closure of the vaginal process of peritoneum as it passes downwards into the scrotum.

It may appear as a *congenital hydrocele* of the cord, from a want of closure of the abdominal orifices of the vaginal peritoneal process, the serous fluid in such an instance gravitating downwards as far as the external ring, the original canal at this spot having been naturally closed, or it may present itself to our notice as a so-called *diffused hydrocele* of the cord, either at an early or late period of life, from a collection of serous fluid between the closed abdominal orifice of the vaginal process and the upper portion of the testis, the fluid being either arrested at the external ring, or passing through it to the upper portion of the testis. In a third class of cases it may appear as a small isolated bag of serous fluid situated between any of these points, moveable with the cord and connected with it, its circumscribed nature having been determined by a more complete closure of the vaginal peritoneal process, and by the limited space into which the effusion has taken place.

Under all these conditions, however, the pathology of the affection is the same, and the symptoms indicating its presence vary only according to the size and tension of the sac which contains the fluid. In the congenital form in which a communication exists with the peritoneal cavity, the hydrocele will never be found very tense—it will have a smooth and uniform outline, and will give all the symptoms of fluctuation; it will disappear also more or less readily by pressure, or by the patient assuming the recumbent position; the fluid then gravi-

tating upwards into the abdominal cavity, with a rapidity which varies according to the size of the peritoneal communication.

In the diffused hydrocele of the cord this disappearance of the swelling by rest or pressure will not take place, for in such the abdominal opening of the vaginal process will have naturally closed. The tumour will thus appear as a baggy or tense elastic swelling in the inguinal canal, which it will more or less fill. It will give to the hand a sensation of fluctuation, and in certain instances it may appear translucent; it will be found moveable on any traction of the testicle, and will be accompanied with pain in proportion to the amount of tension of the cyst or of the inflammatory action.

In the more localized or apparently cystic hydrocele of the cord the same symptoms will present themselves. The tumour will be more isolated, probably more moveable and more tense, and it will be readily acted on also by any traction on the testis.

It may occur as a single cyst or as many, but each will present the same symptoms. When a single, tense, moveable cyst exists it may be mistaken for a distinct morbid growth; but the diagnosis of the case ought not to be difficult when care is observed.

Treatment of Vaginal Hydrocele of the Testis.

In the *congenital hydrocele* so common in young life surgical treatment should be very simple, for the disease as a rule readily disappears with age and increasing strength: a little cold lotion applied to the part, such as a solution of the hydrochlorate of ammonia, is frequently sufficient, and tonic medicine often aids the cure; for, as I have already stated, the effusion into the vaginal sac in those instances seems to be often of a passive nature, and its re-absorption may be expected with renewed powers. In the following case the truth of the previous remarks was well illustrated:

CASE 2.—A boy, æt. 6, came under my care at Guy's Hospital in December, 1857, with a congenital hydrocele of the left testicle, about the size of a hen's egg. It had existed from birth to a certain extent, and had varied much from time to time in its size; during the last few weeks its increase had been very marked, and the boy's health had become much impaired: he was pale and cachectic, but no positive disease was

to be observed. The fluid could be made to pass backward into the abdominal peritoneal cavity by slight pressure, but it was evident the peritoneal opening of the vaginal process was very small. Looking upon this case as one of passive effusion, probably due to a simple cachexia, I administered tonics in the shape of quinine, and did not employ any local treatment: at the end of a week the hydrocele was smaller, and in two it had nearly gone, in the third week the swelling had disappeared, and for the time the boy remained under my observation, one month longer, no return had taken place.

I have treated many other cases of this description on similar principles and with like success, having never yet met with a congenital hydrocele requiring a different treatment. The hydrocele found in infancy, or *infantile hydrocele*, is not, however, always of the congenital form, for in these cases of infantile hydrocele there is no communication with the peritoneal abdominal cavity through the neck of the vaginal process. Under these circumstances a different treatment may be required to that which has just been recommended for the last. Cold lotions and tonics, however, in these may be of use, and should certainly be primarily employed, a good hope of success encouraging the surgeon in their use; yet in many instances the treatment will fail to cure the case, and some other more active practice will be demanded. *Acupuncture* may be then employed, and the fluid thus allowed to escape into the cellular tissue around the sac, from whence it may be altogether removed by so-called absorption; but this treatment is not as a rule satisfactory, it being exceptional for a permanent recovery to be secured by such means, and I am disposed to think it better practice to draw off the fluid by means of a fine trochar and canula, and then to excite some fresh action in the membrane lining the tunica vaginalis by stirring it up with the end of the latter instrument.

The following case illustrates the practice:

CASE 3.—*Hydrocele cured by tapping and stirring up.*—A boy, æt. $6\frac{1}{2}$, came under my care with a hydrocele of the left testis of five months' standing: he had been under the care of another surgeon, who had unsuccessfully tried all the usual mild measures. His general health was good. I tapped the

cyst, drawing off a clear serous fluid, and well stirred up the tunica vaginalis with the canula: on the following day some swelling appeared, evidently inflammatory, accompanied with induration: on the fifth day this began to subside, and complete recovery followed.

CASE 4.—*Infantile hydrocele. Failure of acupuncture. Successful treatment by tapping and stirring up.*—William P—, æt. 13, came to me, Oct. 31st, 1864, with a large hydrocele of the right testis of one year's duration. He had been under a surgeon's care for some time, and had been treated by lotions and the continual application of iodine without benefit. I punctured the part with a needle in several points, and the scrotum soon became œdematous; in one week, however, all the symptoms had returned. On Nov. 17th I tapped the cyst, and stirred it well up, and by Dec. 20th recovery was complete.

The treatment of vaginal hydrocele in the adult next claims our attention, and in modern practice it has become very simple.

In early examples, when the hydrocele is still small, and consequently of little inconvenience, it is as well perhaps to leave it alone, for, unless causing anxiety to the patient, or proving troublesome or unsightly from its size, there is no necessity for interference. *In very old people*, again, it is as well not to interfere, unless a strong necessity exists, for sloughing of the scrotum, suppuration of the sac, and other bad results, occasionally occur in these cases from slight causes. It must be added, however, that the feelings of the patient are the best guide to interference, but slight enlargement causing in some patients as much pain as or more than great. Should, however, some treatment be demanded, as a primary measure simple tapping should be performed, the fluid being drawn off by means of a moderate-sized trochar and canula. In doing this some care is called for, although the operation is really a simple one, as difficulties are often made by the operator, and dangers result from want of caution.

On the Tapping of a Hydrocele.

As a point of primary importance, the true position of the testicle should be made out. In the majority of cases it will be found at the posterior part of the tumour, and unless this be

very large, towards its lower part. At times, however, when the testicle is inverted, it will be found in front, as well as in certain other cases which are difficult to explain; the true position of the gland can generally be made out by manipulation, and also by the want of translucency of the tumour at a certain spot. Having made out to a fair certainty the position of the testis, the tumour is to be taken in the left hand and grasped firmly at its neck, at the same time care being taken to stretch the integument well over the cyst, and to render the cyst wall tense and unyielding. The trochar and well-fitting canula is then to be taken in the right hand (it having been previously well oiled), and the index finger placed about three quarters of an inch from the extremity of the canula, the front of the thumb resting on its distal end, the object of the position of the finger being to prevent the instrument going in too far with a rush, and thus endangering the testicle, and that of the thumb to press home the canula over the trochar when being withdrawn. The tumour is then to be punctured at its lower part, care being taken to avoid any large vein, and the fluid allowed to run out. Having completely emptied the cyst, the punctured integument should be firmly held, and nipped up with the thumb and finger of the left hand, and the canula withdrawn, a little cold air or irritation of the finger generally causing sufficient contraction of the dartos to close the wound and prevent hæmorrhage or any further escape of the remaining fluid; a piece of lint may, however, be applied for purposes of cleanliness and to prevent friction.

In certain examples of this disease in the adult I have been induced to stir up the cyst as I have described in the hydrocele of the young, and have met with some success; in no instance has any evil consequence resulted from the practice, and in several a cure has taken place, evidently from inflammation. I would advise this practice to be confined, however, to young adults. As a palliative practice it is scarcely necessary to recommend any other than the one just described,—it is very simple, more efficacious than any other, and not more dangerous. Acupuncture has been advised, but it has no practical advantage over the simple tapping, and it is certainly less successful in its result. In exceptional cases it may be good, particularly in such a case as Mr. Curling has related on the

authority of Mr. Luke, of a gentleman who was about to proceed to a part of the world where surgical advice could not be secured, and where the patient could then perform this simple operation on himself.

The period of relief which a patient experiences from a simple tapping varies exceedingly from a few weeks to many years ; and even in the same patient the interval will be found to vary from time to time. In the young and middle-aged adult, when the general health is sound and a return of the effusion has taken place, unless any personal objection should be made, it is generally advisable to adopt some plan for a more permanent cure, and that leads me to consider what is generally described as the operation for the radical cure ; in old men, however, it is the soundest practice to rest satisfied with the palliative treatment, as it is only in exceptional cases that the radical cure should be proposed.

On the Radical Cure of Hydrocele.

It is not necessary, in a clinical paper like the present, to review all the various plans which have been, and are now employed, by different surgeons at different times, for the permanent cure of a vaginal hydrocele ; it will be more to the purpose to give the conclusions to which my own experience has led me, and which tend to support a line of practice which is most successful and very simple, viz., the injection of the cyst with a solution of iodine. It is not perhaps a question of much importance whether the fluid should be concentrated or diluted, or whether it should be permanently left in the cyst or withdrawn after a few minutes have been allowed for it to act upon the surface—such minor differences may be left to the fancy of the operator. But my own judgment leans towards the practice of injecting a mixture of two drachms of the compound tincture of iodine with a like quantity of water, and leaving it in, care being taken that the canula should be previously well pushed home into the cyst, and that no iodine solution be allowed to escape into the cellular tissue outside the sac.

By this practice a radical cure is almost certain to be secured ; it being purely exceptional for any failure to follow

this method or any evil to result, for when failure follows, it is generally due to the fact that a hydrocele has been injected when some inflammation of the testicle coexists, and from which it has been produced, for in all examples of hydrotestitis the practice of injection must be looked upon as being bad, as it is treating the result of a disease, and not the disease itself—the effect, and not the cause.

I do not propose to enlarge upon the other forms of treatment which have been employed, as incision, caustic, or even setons ; for the practice I have advocated is so simple and successful as to surpass all others.

Treatment of Hydrocele of the Cord, with Cases.

The principles of treatment which have been laid down in cases of hydrocele of the testis are likewise applicable to those of hydrocele of the cord, their application requiring only such modifications as may be demanded by the altered position of the affection.

In the *congenital* hydrocele no special treatment is required, for, as strength comes to the child, the fluid will probably be reabsorbed, and should this result fail to follow, tonics should be given to expedite the cure.

In the *diffused* or *encysted* hydrocele of the child or adult more active treatment is frequently demanded, but not in all cases ; for the fluid will at times disappear without treatment, although it may be to recur at a later date ; still the affection ceases to trouble, and, unless some real inconvenience is produced by its presence, it is as well to leave things alone. Should, however, pain or inconvenience be experienced, something must be done, and without doubt the best practice is to evacuate the fluid. In small, tense, encysted hydroceles the practice of evacuating the fluid by acupuncture is certainly a sound one ; tapping by the trochar and canula is an operation of some difficulty where the cyst is small, and acupuncture answers in these small cases very well ; it may be done with any needle, but probably a cataract needle is the best, several openings being made.

Should this fail and further measures be demanded, an incision into the cyst is probably the best practice, but this

should not be carried out unless as a last resource. Should, however, the cyst be below the external ring, tapping may be employed as in any other case of ordinary hydrocele.

The radical cure by injection I have never used or seen employed, and there are mechanical reasons against the practice; the treatment by incision is the best in these cases, and answers every purpose.

The following cases of hydrocele of the cord may be read with interest, as tending to illustrate the different forms which occur in practice, and their different treatment.

CASE 5.—*Double congenital hydrocele of the cord down to external abdominal ring.*—John C—, æt. 10 weeks, was brought to me on September 6, 1860, with congenital hydrocele of the cord on both sides, filling the vaginal process of the peritoneum as far as the external abdominal ring. The fluid could be gradually expressed into the abdominal peritoneal cavity by manipulation. No treatment beyond a little cold lotion was advised, and in a month the child was well.

CASE 6.—*Double hydrocele; on the right side vaginal hydrocele of the testis; on the left side encysted hydrocele of the cord.*—William B—, æt. 6, was brought to me, April 8, 1858, with a vaginal hydrocele of the *right* testis of eight months' standing, coming on after a fall; and with an encysted hydrocele of the *left* cord below, but close to the abdominal external ring, of eight days' duration. The cyst was tense, the size of a walnut, and very painful, the testis being quite distinct below the cyst, and the child was very pale and cachectic. Quinine was given, and cold lotion applied to the parts. After two weeks had passed away without the local disease altering in its character, the hydrocele of the cord was tapped, clear serum being drawn off, and after two weeks no symptoms of return appeared. The fluid in the right tunica vaginalis showed symptoms of absorption. Tonics were persevered with for six weeks, when a perfect cure resulted.

CASE 7.—*Hydrocele of the cord protruding through the external abdominal ring.*—William F—, æt. 5 years, came under my care on August 25th, 1859, with a tense hydrocele of the right

cord, occupying the inguinal canal, and protruding through the external ring. It was very tense and painful, having existed for one year and a half. I tapped it at the external ring, and evacuated some clear serum; on September 26th no signs of a re-collection existed.

CASE 8.—*Encysted hydrocele of the cord at internal ring, simulating a hernia.*—Henry D—, æt. 10, came under my care on May 6th, 1861, with a tense cyst, the size of a nut, in the left inguinal canal, close to the internal abdominal ring. It had been observed for three months, and at times caused pain. The left testicle was in the scrotum. Traction being made upon the cord, the cyst could be well brought down, but on the parts being left alone, and the patient lying down, the cyst could be pressed out of view into the abdomen, or brought into view at will by drawing on the cord.

No active treatment was adopted.

CASE 9.—*Large hydrocele of the cord between the external ring and testis, cured by tapping and stirring up of the cyst.*—Robert L—, æt. 9, came under my care at Guy's Hospital, with a large hydrocele of the right cord, the size of a goose-egg, of some months' standing. The right testis was below it, and clearly distinct from the cyst. I tapped the tumour, drawing off some clear albuminous fluid, and stirred up the cyst; consolidation, followed by recovery, ensued.

CASE 10.—*Hydrocele of the cord cured by tonics and cold lotion.*—Thomas K—, æt. 16 months, was brought to me on July 25th, 1864, with a tense globular cyst, the size of half a walnut, in the left groin. It had been observed three weeks, and caused some pain. Traction on the testis failed to move the cyst, which apparently was held tight in the canal. The cyst was quite translucent. Tonics and cold lotion were given, and on August 22nd the fluid had disappeared.

CASE 11.—*Encysted hydrocele of the cord.*—Dennis P—, æt. 25, came under my care on April 3rd, 1865, with a cyst the size of a large walnut, connected with the spermatic cord in the right groin. It had existed for one month, and was

readily movable on making traction on the cord. He had had the same thing a year before, on the same side, but it had lasted three months, and disappeared.

The man being out of health, tonics were prescribed in the form of quinine, no local treatment being adopted.

On April 13th the cyst was smaller, and by the 24th it had disappeared, the fluid having been completely absorbed.

On June 5th the recovery was still perfect.

CASE 12.—*Hydrocele of the cord, with an undescended testicle.*
—W. W—, æt. 37, came under my care at Guy's Hospital, on July 3rd, 1865, with a swelling in the left groin of four days' duration. It was tense, fluctuating, and occupied the position of the inguinal canal. It was not, however, painful on manipulation. The testis was not in the scrotum. The man told me that the testicle had never come down lower than the inguinal canal; that its usual position was just external to the internal ring; and that occasionally he experienced considerable pain in the organ, relieved only by his pressing it upwards into the abdomen.

Quinine was given and cold lotion applied, and by July 12th the swelling had diminished. It was then made out that the testicle occupied the lower part of the swelling, and was near the external ring, the fluid occupying the cord down to the testicle; on July 26th the fluid had nearly disappeared, and on August 10th he was cured.

CHAPTER II.

ON ENCYSTED HYDROCELE OF THE TESTIS.

ON examining the testes of the adult after death it is by no means an uncommon occurrence to meet with small cysts connected with the epididymis; they may be single or multiple, and, in many instances, are very numerous; they are generally more or less pedunculated, and, as a rule, connected with the

upper portion of the epididymis, and are filled with a clear watery fluid, containing, in certain cases, some granules.

The pathology of the formation of these cysts is somewhat difficult to understand, and surgically it is of small importance, for they seldom, if ever, become of sufficient size to cause inconvenience, or to require any surgical interference; indeed they are rarely diagnosed during life, and are discovered only on post-mortem dissection.

Another kind of cyst is, however, occasionally met with connected with the testis, and in close contact, if not association, with the epididymis. It springs from the same part as the smaller cyst, but grows to much larger dimensions, and generally contains a very different kind of fluid. Its origin is as obscure as the former kind; it enlarges very slowly, does not give rise to any pain, nor produce any inconvenience other than that caused by its size. It seldom requires treatment in its early stage, and, as a rule, many years are allowed to pass before interference is demanded, the tumours frequently developing for twenty years or more before advice is sought.

These cases are by no means so common as the ordinary vaginal hydrocele—not more than 5 per cent. of the cases of hydrocele being of this kind.

A cyst is occasionally developed between the tunica albuginea of the testis and the tunica vaginalis testis, the pathology of which is very obscure. Cases of this are described by Curling and Hutchinson. The Guy's Museum contains a specimen. I know of no means of diagnosing their existence. Their treatment would be similar to that of other cysts.

Symptoms and Diagnosis.

In an early stage of this affection the diagnosis is not difficult, for the cyst usually appears as a kind of budding of the testis, or rather of the upper portion of the epididymis. It shows itself as a tense, hard, globular, and, in some cases, pendent tumour connected with some portion of the spermatic duct, being more or less intimately connected with it; and beyond these special symptoms it does not give rise to any others

worthy of record. It is generally discovered by the patient by accident, and, when as large as the natural testicle, has doubtless at times been set down as an extra organ.

It is rare, however, for the surgeon to be consulted in such a case in so early a stage, for, as a rule, the tumour will have been allowed to grow to an inconvenient size before advice is sought. In forming a diagnosis of the case its history will often at once throw some light upon the nature of the growth, for the surgeon will, in all probability, discover that its increase has been extremely slow, twenty years or more at times passing before the cyst attains anything like a large size; these encysted hydroceles probably never growing so fast nor acquiring such dimensions as the more common vaginal kind. *Extreme slowness of growth is, then, the first point to notice for Diagnostic purposes.*

The next feature which demands attention in the development of these cysts is of some value, for it is often rather striking, relating, as it does, to the shape and outline of the growth, for the encysted hydrocele never in its early stage, and rarely in any, assumes the appearances of an ordinary vaginal hydrocele. Appearing, as it does at first, as a kind of budding of the testis or epididymis, as the cyst enlarges it seems eventually to absorb the testicle, but it almost always maintains a globular outline, and never acquires that pyriform shape which is said to characterise the vaginal hydrocele. *The globular shape of the Hydrocele is the second point which tends to point out the nature of the case.*

The position of the testis in its relation to the cyst next claims attention, and in this a marked difference exists between the encysted and vaginal hydrocele. In the latter, as a rule, it is to be found at the posterior part of the sac, and towards its lower part. In the former, or encysted, it is to be found almost constantly in front, or at one side, or below, being but rarely found at the posterior part. The reason for this is readily explained. The cyst is usually connected with the epididymis, which normally lies at the posterior part of the gland. *The anterior position of the Testis is the third point which characterises this affection.*

The nature of the cystic contents now demands a notice, for it differs in many points from the fluid of a vaginal hydrocele and is very characteristic.

It will be remembered that in the *vaginal* hydrocele the fluid was described as generally clear, like the serum of the blood, more or less albuminous and of a straw colour, frequently containing fibrine in solution, and at times spontaneously coagulable, blood and cholesterine being also occasional elements.

In the fluid of an *encysted* hydrocele none of these elements are generally present, for it is, as a rule, a limpid, slightly saline liquid, more or less watery or opalescent, as if mixed with milk, always containing some granules in suspension, and frequently spermatozoa. *The nature of the fluid is consequently very peculiar, and forms a fourth material point for diagnostic purposes.*

The origin of the spermatozoa in these cysts is a point of peculiar interest, for it has been a disputed point with pathologists for many years. Mr. Curling's investigations on this subject have, however, fairly proved that in some instances their presence is certainly due to the rupture of one of the spermatic tubes which pass over and are in close connection with the walls of the cyst—this rupture taking place generally from an injury, and being indicated by some rapid increase in the size of the cyst; for Mr. Curling has shown that, in several of the cases in which spermatozoa were found, this history was given, and in some he was even able to demonstrate a distinct communication between the cyst and the spermatic tube.

The following case tends to support his views.

CASE 13.—*Encysted hydrocele of twenty years' growth; rapid increase after an injury; three distinct cysts, two containing spermatozoa.*—Robert P—, æt. 60, came under my care, at Guy's Hospital, on December 28th, 1863, with an encysted hydrocele of the left testicle of twenty years' growth. The increase had been very slow till the last month, when the tumour had doubled its normal size, this rapid growth having followed an injury produced by a fall.

When first under my observation the scrotum contained

an irregular cystic tumour on its left side, evidently made up of several cysts, of which three of large size could readily be distinguished, two being very tense, while the third was baggy. The testis was found on the inner side of the tumour.

Tapping was at once resorted to, and the largest cyst emptied, many ounces of a milky fluid being drawn off. The second tense cyst was then tapped through the same opening, with the same result, and the fluid collected in a distinct glass. The third cyst was also tapped, but in this the fluid was quite watery. The first two contained abundance of spermatozoa, the third did not contain any; a good recovery took place.

The treatment of Encysted Hydrocele.

However interesting may be the two forms of hydrocele which we have just been considering, both in their pathology and in their points of difference, practically the treatment of both is alike. When anything is required to be done, simple tapping may suffice, and as a primary measure it should always be preferred; but, should the radical cure be required, the injection by iodine may be carried out. The slow growth of these cysts, however, and the equally slow re-collection of their contents after tapping, are points which indicate the propriety of adopting the palliative treatment in the majority of cases.

On the spontaneous disappearance of a Vaginal Hydrocele, with a Case.

It is well known that in children hydroceles, as a rule, disappear spontaneously with little or no treatment, but in adults such a result is most uncommon. Mr. Pott, Sir B. Brodie, and Curling relate cases of this kind, and attempt to explain the process by which such a recovery takes place with more or less happiness. A single instance of the kind has passed under my hands for treatment—a brief record of which follows:

CASE 14.—Charles C—, æt. 64, came to me at Guy's Hospital on Jan. 29th, 1863, with a hydrocele of the left testis, the size of

a cocoanut. He had had it two years, and had been tapped six times, having been under my care on each occasion. He came under my notice at this date, when I was about leaving the hospital, and I did no more than examine the parts which were tense and rather painful, telling the patient to return to me, in the course of a few days, to be relieved. When he came the following week all indication of swelling had completely disappeared, the man assuring me that he had gone to bed the night of the second day before his visit with a large tumour, and that when he awoke it had disappeared. He added also that he had on the following morning passed a large quantity of thin urine. The patient was a steady man and a widower, and told his tale with all the appearance of truth and with some astonishment.

In three months the fluid had re-collected, when he was tapped.

I will not attempt an explanation of this case.

CHAPTER III.

ON HÆMATOCELE.

As the term hydrocele is applied to the effusion of serous fluid into the sac of the tunica vaginalis, and of its tubular prolongation upwards to the internal ring, as well as into the cysts which have been already described as being connected with the testis, so the term hæmatocele is employed to designate an effusion of blood into the same regions. We thus have—

A vaginal hæmatocele of the testis and an encysted.

A diffused hæmatocele of the cord and an encysted.

Hæmatocele may occur in an organ which had not previously shown any symptoms of disease, or it may be associated with a hydrocele. It may appear spontaneously without an injury, or as the result of a blow, strain, or the tapping of a hydrocele.

It may attack patients at any period of life, and in certain rare cases at a very early age, even in infancy, and I have the records of a case in which it was said to have made its appearance at two years of age.

In the notes of my cases various causes have been assigned for its production. In one instance "it appeared gradually without any known cause." In another "it occurred when hard at work pushing a wheelbarrow, something giving way with a snap." In the majority it came on as an immediate consequence of a blow, and in several as the result of the tapping of a hydrocele. In all, however, the result was the same—a more or less rapid formation of a tumour in the position or neighbourhood of the testicle.

Symptoms and Diagnosis.—The symptoms of a hæmatocele which has made its appearance without any injury or assigned cause are very obscure, and are pretty well summed up in the prominent one of a gradual and uniform enlargement of the organ. The swelling will vary in shape as in the hydrocele, but, like it also, it may present a more or less pyriform outline. The testicle will always, in the vaginal hæmatocele (on careful manipulation being made), be detected somewhere in the sac, and usually at its posterior and lower part, the peculiar testicular sensation being produced by slight pressure.

When caused by a sudden strain or injury the enlargement will be more sudden and rapid, it will be found to follow close upon the receipt of the accident, and the rupture of the blood-vessel may even be announced by the sensation of a sudden snap or giving way.

The local symptoms will be similar to those already described.

The tumour, at its first appearance, may be somewhat soft, and obscure, or clear fluctuation may at times be detected in it. But if much time be allowed to pass before coming under observation, this fluctuation will not, in all probability, be made out, for the effused blood rapidly coagulates, and gives rise to the sensation of a solid growth. The sac of the hæmatocele, whether tunica vaginalis or cyst, rapidly alters in character and becomes thick, and in certain cases, fibrous or even cartilaginous, at first from the mechanical coagulation of the

fibrine of the blood upon its inner surface, and in cases of longer standing from distinct inflammatory changes, brought about by the presence of the blood acting as foreign matter. In some instances this thickening of the cyst is very great, even to half an inch.

When a hæmatocele has followed upon a hydrocele, there will usually be a sudden enlargement of the part after the strain or injury, accompanied with more or less pain, this pain apparently depending upon the amount of distension to which the cyst has been subjected. Should it follow the operation of tapping it will, as a rule, be recognised by the escape of more or less blood or bloody fluid at the time of the operation ; and the rapid re-filling of the hydrocele sac or cyst with a more solid and opaque material.

To form a correct diagnosis of hæmatocele the history of the case is most important, indeed more so than the local symptoms, for it is certainly true that by these alone, in some instances, it is almost impossible to make out the true nature of the affection.

By way of summary it may be stated that a hæmatocele is usually a uniformly smooth, tense, and *non-transparent* tumour, with an *indistinct* sensation of fluctuation, but with *distinct* evidence of testicular pain on pressure. It may be accompanied with pain during the early period of the affection, from the distension of the cyst, but not at a later date, or during its chronic stage, unless softening down. As time passes it will become harder, should no symptoms of inflammation show themselves ; but on their manifestation, evidence of suppuration will soon appear, for hæmatoceles have not, as a rule, a disposition to remain quiet, as the hydroceles, but tend to open outwards by the breaking up of the coagulated blood which has been effused, and the inflammatory process.

The symptoms which indicate the presence of a *hæmatocele of the spermatic cord* are somewhat similar to those already described for vaginal hæmatocele, the difference in locality being remembered ; and it is generally produced by a blow or strain, as is the ordinary vaginal hæmatocele. It is to be diagnosed by the suddenness of its appearance, or the suddenness of the enlarged hydrocele sac—by the opacity of the swelling, and tendency to consolidation which it possesses,

also by the accompanying ecchymosis of the parts. Cases are recorded by Bowman, Curling, and others, in which this disease obtained enormous dimensions, but such examples are very rare, indeed, the affection is by no means common.

On the Source of the Blood.

A very common question with students is, as to the origin of the blood in these cases of hæmatocele, and in the spontaneous cases, and those following a strain or injury with an apparently sound testis, this question is difficult to answer. There can be little doubt, however, that a distinct rupture of some of the vessels, probably veins, which ramify upon the body of the testis, or on the tunica vaginalis, must take place.

When occurring upon a hydrocele, or after the operation of tapping, it is probably due to the distinct rupture or perforation of one of the large veins which ramify outside the tunica vaginalis, into its interior, or of one in the body of the testis.

Scarpa relates a case of hæmatocele in which the spermatic artery was wounded, and Sir A. Cooper another in which a distinct rent in the tunica vaginalis was found on dissection. This latter condition is probably the most common.

Treatment.—The treatment of hæmorrhage into the tunica vaginalis testis, or cord, differs in no respect from the treatment of hæmorrhage into any other part of the body. In the very earliest period of its occurrence, rest in the horizontal posture, with the testicles well raised, and the application of cold lotion, are the most efficient means to arrest the flow of blood and relieve pain. By such means the blood may also be reabsorbed and all future mischief be prevented. Should the blood, however, remain fluid for a long time and no symptoms of reabsorption or of inflammatory action manifest themselves, it is probably a sound practice to draw off the fluid contents with a trocar and canula. In the following case this practice was adopted with good effect.

CASE 15.—*Hæmatocele cured by tapping.*—Thomas W—, æt. 21, came under my care at Guy's Hospital, on February 16th,

1865, with an epididymitis of the left testis, associated with a gonorrhœa. He called my attention at the same time to the condition of his right testicle, which was larger than the left, and of a very firm fibrous feel. It appeared that eight years previously he had received a severe injury to the right organ, which was followed at once by its rapid enlargement. He applied to a surgeon, who tapped the part, drawing off pure blood, and a rapid recovery took place, the testicle remaining, however, permanently enlarged, but in all other respects quite natural.

Should signs of inflammation appear soon after its occurrence, cold lotion and leeches, with the aid of saline purgatives, may occasionally be found efficient to arrest its progress, and to allow of the subsequent reabsorption of the effused blood. But should symptoms of suppuration show themselves, or of the softening down of the coagula, a free incision into the cyst or tunica vaginalis is the only sound practice, the whole semi-solid contents being thoroughly turned out, and the interior of the sac allowed to granulate.

In old and chronic cases, with thickened sac walls, the same treatment is also effectual.

I possess the records of many cases in which this practice was carried out with marked benefit: in one of only four months' duration, and in another of twenty-nine years, in which the tunica vaginalis was at least half an inch thick, and in both a good recovery followed as the result.

I need hardly add that excision is rarely called for in the treatment of these cases, although from difficulties in the diagnosis it may occasionally have been had recourse to. I have seen several instances in which the practice was followed on that account, and beyond the loss of the organ no evil resulted.

In old cases of hæmatocele, in old men, the practice of excision is probably the best—an example of which will be recorded—but in the young, and middle-aged, it cannot be advised.

The treatment of hæmatocele of the cord is to be conducted on similar principles.

CASE 16.—*Hæmatocele which broke down eighteen months after*

its first appearance. Sloughing of the scrotum and recovery.—William S—, æt. 31, came under my care at Guy's Hospital on February 9th, 1865, with an extensive ulceration of the scrotum and exposed testicle. The following is the history of the case.

Two years previously, when at work, he received an injury to his right testicle, which at once rapidly enlarged, and became the seat of severe pain. This soon, however, subsided, but the swelling remained. For about one and a half years the tumour underwent little or no alteration, and was hard and painless. At this time it began to cause uneasiness, and to undergo some change; the scrotum became inflamed, and glued to the testicle. The tumour also began to feel soft, and was evidently inflamed. An abscess formed, gradually enlarged, and three weeks before I saw him burst, many ounces of blood and matter escaping. When I saw him, there was a large sloughing sore occupying half the scrotum, which was adherent at its margins to the testicle. This gland appeared somewhat larger than natural, but was entire, and granulations existed upon its exposed fibrous covering. Under the influence of stimulating lotions and tonics the parts rapidly healed, and the surface of the testicle and the scrotum granulated healthily. The man soon passed from observation, apparently sound. On April 20th he was put down as cured, the testicle being fixed to the scrotum, but apparently healthy.

CASE 17.—*Hydrocele of fifteen years' growth becoming a hæmatocele; excision of tumour.*—James S—, an Irish labourer, æt. 52, came under my care on February 26th, 1865, with an enormous tumour on the right side of his scrotum. It had been growing gradually for fifteen years, and had caused little or no pain, it had appeared without any known cause, but for the last six months its increase had been more rapid, this increase in size having immediately followed an injury he had sustained when at work. The tumour was evidently in the position of the right testicle, globular, and semi-fluctuating; it was smooth in outline, except posteriorly, where an apparent outgrowth existed, and felt firm and heavy; it was not painful on manipulation, although pressure posteriorly caused

testicular pain. The scrotum was slightly oedematous, and the weight of the tumour caused much pain in the loins.

On April 25th, the man being under the influence of chloroform, I cut down upon the growth, exposing the tunica vaginalis. I then tapped the cyst, and drew off a quantity of thick fluid, like pea-soup, containing the elements of broken-down blood. The tunica vaginalis was much thickened, and was of cartilaginous hardness, its walls being studded with ossific deposits. The testicle was much enlarged and flattened out, being situated at the posterior part of the tumour, and corresponding to the outgrowth already mentioned. The whole tumour was then excised. The testicle was subsequently found to have been the seat of general tubercular disease. The tunica vaginalis had been enormously distended and thickened, and contained ossific matter in its walls. It seems probable that the original disease had been a hydrocele, and had become a hæmatocele after the injury. The disease of the testicle must be looked upon as accidental.

CASE 15.—*Hæmatocele as a result of tapping a hydrocele.*—An old man, æt. 66, who had been the subject of a hydrocele on the right side for sixteen years, and had been frequently tapped, applied to me on February 3rd, 1862, for renewed relief, and was passed into the hands of an experienced dresser for the purpose of being tapped. The tumour was large, and the testicle was naturally placed at the posterior and upper portion of the cyst. The operation was performed, and the fluid drawn off, a considerable quantity of blood following the clear fluid, and the puncture being accompanied with much pain, the patient stating at the time that the testicle was wounded. The man went home after the operation, and at night found the scrotum to be as large as ever, and somewhat painful. He kept quiet for three weeks, hoping all would be well, but finding the symptoms did not disappear, he again applied to me for advice, when he was at once admitted into the hospital.

The scrotum was much distended, with a large tumour of a pyriform shape, and smooth regular outline. It was indistinctly fluctuating, and somewhat tender on manipulation, particularly at its posterior part. There was some constitutional

disturbance, and an occasional rigor. In another week the signs of suppuration in the part were more marked, and as a result a free incision was made into the tumour, letting out a quantity of pus and broken-down blood; from that time everything progressed favorably, the man leaving the hospital in a month perfectly well.

CASE 19.—*Hæmatocele into the tunica vaginalis after an injury; rapid absorption of the blood.*—William F—, æt. 18, a healthy man, came under my care on June 8th, 1865, with an apparent enlargement of the right testicle, which had immediately followed an injury to the part four days previously. The tumour was globular, indistinctly fluctuating, and perfectly opaque; on manipulation the presence of the testicle could be made out by its special sensation towards the posterior part of the swelling, and there was evidence of ecchymosis in the scrotum. Some cold lotion was applied, and a saline purgative given. In one week the swelling had much subsided, and in a month the man was pronounced convalescent. There was, however, some slight enlargement of the part.

CASE 20.—*Hæmatocele of the cord.*—George S—, æt. 28, came to me at Guy's Hospital on July 20th, 1865, with a tense, globular, opaque swelling, the size of a goose-egg, in close apposition with the upper part of the testicle, but distinct from it. It had existed for twelve days, having been produced by a blow from a cricket-ball. The scrotum was also much ecchymosed, but the testicle was of its normal size. The swelling was painless, and evidently in the lower part of the cord, and was clearly a hæmatocele. Cold lotions were applied, and a mild aperient given; the swelling gradually diminished, and on August 18th it was not half its former size, and was very hard, absorption evidently going on satisfactorily, it was quite painless, and except from its mechanical inconvenience gave rise to no annoyance. The man is now under treatment.

CHAPTER IV.

ON INFLAMMATION OF THE TESTICLE.

Epididymitis.

UNDER the term *Orchitis*, most authors have been in the habit of including the inflammations of two distinct portions of the testicle, and of mixing up the symptoms of their several affections to the prevention of a sound and clear understanding of the subject. In the present paper I shall attempt, as far as I can, to separate the two, and to describe inflammation of the epididymis as one affection, and inflammation of the true secreting gland as another, calling the former epididymitis, and the latter orchitis. In certain cases, it is true, both structures are involved in the inflammatory action, and to this I shall apply the term testitis; the three words accurately indicating the true seat of the malady, and consequently tending to facilitate a better understanding of the subject.

All surgeons will be ready to admit the distinctness of these two parts, anatomically and physiologically, and it is as well also to acknowledge that pathologically they are constantly divided, for of this I am certain, that to the student of the affections of this organ, this division tends to clearness, and to a more ready appreciation of its several diseases.

As a preliminary to the more special clinical and pathological consideration of these diseases, the following observations of Mr. Paget, as given by Curling, upon the development of the epididymis and testis, may be read with interest and advantage.

Mr. Paget observes "that, in the normal course of human development, the proper genital organs are in either sex developed in two distinct pieces, namely, the part for the formation of the generative substance, the testicle or ovary, and the part for the conveyance of that substance out of the body, the seminal duct or ovi-duct. The testicle, or ovary, as the case may be (and in their earliest periods they cannot be distinguished) is formed on the inner concave side of the corpus Wolffianum, and

the seminal or ovi-duct, which is originally an isolated tube closed at both extremities, passes along the outer border of that body from the level of the formative organ above, to the cloaca or common sinus of the urinary, genital, and digestive systems below. The perfection of development is attained only by the conducting tube acquiring its just connections at once with the formative organ, and through the medium of the cloaca with the exterior of the body. The sexual character is first established when, in the male, the formative and conducting organs become connected by the development of intermediate tubes which constitute the epididymis; or when, in the female, a simple aperture is formed at the upper extremities of the conducting tube, and is placed closely adjacent to the formative organ. In both sexes alike the lower extremities of the conducting tubes first open into the common cloaca, and subsequently, when that cavity is partitioned into bladder and rectum, or bladder, vagina, and rectum, they acquire in each their just connections, and become, in the male, the perfect vasa deferentia, and, in the female, Fallopian tubes and uterus."

I will remind the student that the epididymis naturally forms the posterior part of the testicle, and the secreting portion, or true gland, the anterior; that the former in a perfect healthy state is only indistinctly felt, the vas deferens on being traced downwards from the cord, losing itself as it were in this part. The body of the gland is always to be made out by its smooth and elastic globular form.

SECTION I.

On Epididymitis, or Inflammation of the Seminal Duct.

Inflammation of the epididymis is almost always a consecutive affection, and occurs in association with a gonorrhœa, or as the result of some other irritation of the urethra, such as the presence of a calculus, or the passage of a sound or lithotrite. It generally comes on suddenly, and is accompanied with considerable pain, a marked enlargement of the epididymis, or posterior part of the testicle, forming its chief local symptom. It is a very painful affection, and is accompanied

with special tenderness of the part, this tenderness being readily traceable up the cord, which is occasionally swollen and oedematous; the inflammation being a direct extension from the urethra down the vas deferens to the epididymis—in fact, being an inflammation of the true seminal *duct*, and not of the seminal *gland*.

This enlargement of the epididymis is very rapid, and in some instances very great. It invariably assumes a special outline when uncomplicated, that is, when confined to this special part, the epididymis appearing of a boat- or truncated half-moon shape, holding the body of the testicle in its concavity. The lower portion of this body is usually the most enlarged, being composed of the greater number of the convolutions of the tubes, and consequently containing more cellular tissue, for it is from the infiltration of this cellular tissue around the inflamed seminal duct with inflammatory effusion, that this enlargement is produced.

This affection generally is an acute one, it comes on suddenly, and runs a rapid course, and is accompanied in most patients with some constitutional disturbance. In some subjects this is very severe, in others it is of a milder description, the sharpness of the inflammation, and the peculiarity of the patients, influencing the severity. It is characterised by the special symptoms already indicated, and its diagnosis is not, consequently, difficult.

It is at times, however, complicated with other conditions, such as an inflammation of the true secreting portion of the testicle, but this complication invariably occurs as a secondary symptom, and is produced by direct extension of the disease from the seminal duct to the seminal gland. I have never seen a genuine orchitis, or inflammation of the seminal gland, as a result of gonorrhœa, except as an extension of the inflammation from the epididymis, and it is in quite exceptional examples of this affection that the body of the testicle is ever involved.

When the gland itself is inflamed, the diagnosis is readily made, the enlargement and great tenderness of the part clearly indicating the affection. The whole organ presents an expanded but flattened aspect, the swelling of the epididymis posteriorly, and of the body of the testes anteriorly producing this peculiar

laterally flattened outline. The two inflamed parts will, however, be always felt distinct from each other, and can be readily diagnosed. There is, however, a second complication of epididymitis, which is more common than the one just described, and that is, the effusion of fluid into the tunica vaginalis, the production of an acute hydrocele, and I am disposed to think that it is this apparent swelling of the organ which has given rise to the mistaken idea that true testitis is a common affection after gonorrhœa, for an effusion into the tunica vaginalis is by no means an uncommon complication of epididymitis. The enlargement of the organ from such a condition is, however, very different from the enlargement already described as due to an inflamed gland; it is more globular, tense, and elastic; it is certainly equally painful with that affection, but its true nature can be readily made out by its translucency and by the presence of fluctuation on palpation. It is the result of a direct extension of the inflammation from the epididymis to the tunica vaginalis, and the following explanation of its occurrence by Gendrin, as given by Curling, with his assent to its soundness, seems most satisfactory, for it is certainly borne out by clinical observation. He says, "when the subserous cellular tissue, which always participates in the inflammation of a serous membrane, penetrates into the interior of an organ, it becomes a ready means of communicating the inflammatory action, but when the contiguous organ in subjacent parts is of a different structure from that of the cellular tissue, the extension of inflammation inwards is checked. Thus, in the case of the inflamed tunica vaginalis, the cellular tissue readily transmitted the morbid action to the epididymis, but the tunica albuginea arrested its progress to the body of the testicle, and this explains the fact, that after inflammation of the tunica vaginalis excited by injection, the body of the gland is rarely found to suffer. On the other hand, the epididymis is seldom attacked with inflammation without the disease being quickly propagated to the tunica vaginalis."

As the disease subsides in the epididymis the hydrocele, as a rule, disappears, it being exceptional for the latter condition to remain when its cause has been removed. As a consequence of this epididymitis, it is by no means uncommon for a con-

siderable thickening of the seminal ducts, and of their surrounding cellular tissue, to remain for many weeks or even months. In the majority of cases this result does not, however, take place, for in the healthy subject there is every reason to believe that with the inflammation all effusion disappears, and the organ is left as sound as it was before. In the cachectic patient this happy event does not, however, always take place, and more or less thickening of the inflamed part will generally be observed, the epididymis feeling indurated and enlarged, and in parts nodulated and cordy. It has been a disputed point by pathologists whether this condition ever leads to an atrophy or destruction of the testicles, or whether it has any influence upon the true function of the organ in causing sterility, and upon this point I have no positive facts to bring forward, but I have certainly seen a wasting of the glandular structure of the testicles after inflammation, the result of an epididymitis, and, in one instance, have witnessed an inflammation of the body of the testis in a young man who married with a marked induration of the epididymis, the result of an attack of inflammation some months previously, which I entirely attributed to the retained seminal secretion from the obstruction to the seminal duct, the result of the old epididymitis.

We know, also, that all ducts or canals are liable to obstruction or to stricture when surrounded by organized inflammatory products; and it is only right to believe that the spermatic ducts are obedient to the same law which governs others. This result may not, however, be very common, although it may certainly occur.

One word as to the side on which this epididymitis most frequently takes place, it having been generally asserted, on the dictum of Sir A. Cooper, that the left side is its most frequent seat. Mr. Curling, in his admirable treatise on the testes, tabulated the collected experience of many surgeons, and showed that in 138 cases of so-called consecutive orchitis, the right testis was the seat of the disease in 78 examples, the left in 49, and both glands in 11. My own figures bear out the truth of these conclusions, for of 73 examples of epididymitis 35 were of the right organ, 25 of the left, 4 were double, and in 9 the fact was not stated.

The right organ is, therefore, more often affected than the

left, but the reverse obtains in hydrocele, in which the *left* testis is the most frequent seat of disease.

I took some pains, during the eight years I registered the cases of gonorrhœa and diseases of the testes, to find out whether the general opinion was correct, that the epididymitis usually appeared on the disappearance of the urethral discharge, and whether it was relieved on its re-appearance—whether it could be traced to any peculiarity in the treatment of the gonorrhœa, or to any neglect, or other cause; and I must confess that I have not been able to connect these phenomena in any way. For it appears that the epididymitis made its appearance during all stages of the complaint, and under every kind of condition, when injections were employed, and when they were not, when copaiba and cubebs had been taken, and when they had not. That in some cases, certainly, the diminution of the discharge and appearance of the epididymitis were coincident it is quite true, but such a result is only consistent with the general rule, that an inflammation set up in one part tends to relieve an inflammation existing in another, and more particularly in a neighbouring tissue. It appeared in the majority of cases of neglected gonorrhœa, and in others in which strong injections had been recklessly employed, but more particularly in the cachectic and irregular living patients, who had been utterly regardless of their affection, and had taken no means to keep the testes well suspended; over-exercise and over-straining seemed, however, to be the most common cause.

Treatment of Epididymitis.

The treatment of this affection must depend upon the intensity of the inflammation, and the severity of the local and constitutional symptoms which it produces. Rest in the horizontal posture, with elevation of the testes or even of the pelvis, active purgatives, with saline medicines, combined in acute cases with tartar emetic, colchicum wine, and hot poppy fomentations to the part, are often sufficient to check the disease at its onset, and to prevent its passing into a chronic stage. A good opiate at night is also a wise measure to adopt. When the local symptoms, with pain, are very severe, leeches may be

applied to the neck of the tumour as the best place, or one of the turgid veins in the scrotum may be opened. The use of mercury in these cases, except as a purge, does not appear to be of much value, although it has the support of many experienced and trustworthy surgeons; personally I object to its use, as being unnecessary in the acute affection.

Should our patient, from social reasons, object, or be unable to keep at rest, the parts must be well supported by a suspensory bandage, or by a handkerchief folded crossways in a triangle, the apex of which is well braced up posteriorly by a piece of tape, or bandage, and the base attached firmly to a band brought round the waist, and the same treatment pursued as we have already indicated.

As a local application in the earliest stage of the disease, Mr. Curling speaks strongly in favour of ice; but not having employed it in this affection, I am unable to bear witness to its value.

The treatment by compression has also its advocates, who speak strongly of its advantages. In former times it was carried out by means of strapping; at the present day it is most efficiently performed by means of an india-rubber bag. Messrs. Hutchinson and Lee have been its chief advocates. It may certainly be used in some cases, but it must be well applied, for at the best it excites at first severe pain, which, however, soon disappears. I have used it but little in the acute affection, but in the more chronic or subacute stage of the disease, treatment by pressure is of great value.

In chronic epididymitis, when the disease has passed into an inactive stage, and little but the *product* of the inflammatory process remains behind, the treatment by pressure appears very valuable, indeed more so than any with which I

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an ointment applied to the part, with pressure, and have had good results from such a practice, but how far my success has been due to the pressure alone I am unable to say. Of late I have been accustomed to employ simple pressure in these cases, and have no reason to believe my success has been less favorable than it had been previously. Tonics have been administered freely in all these cases.

Should suppuration take place as a consequence of epididymitis, a result which occasionally happens, it is well to open the abscess early, and that pretty freely, for by such a practice the discharge finds easy vent, and a good recovery is more likely to occur, while the formation of sinuses is prevented. Water-dressing to the part, and the use of the suspensory bandage, is the best local treatment, but tonics and good living are also generally required.

CHAPTER V.

ON ACUTE ORCHITIS, OR INFLAMMATION OF THE SEMINAL GLAND.

ORCHITIS or inflammation of the seminal gland for the most part occurs as an *acute* affection, as the result of an injury, but it appears at times spontaneously without any such cause, and more particularly in connection with parotiditis, or mumps. As already stated, it may be due to an extension of inflammation from the epididymis or spermatic duct, but it rarely, if ever, takes place as a primary affection in connection with gonorrhœa.

Acute orchitis may also attack the gland in its descent into the scrotum; an interesting example of which will be presently related.

As a *chronic* affection, it is the most common form of disease of the testes which is met with in practice, and as such it may take place as the secondary result of the acute disease, or as a consequence of some constitutional affection, such as gout, but more particularly of syphilis.

Acute Orchitis ; its Symptoms and Diagnosis.

The symptoms of acute orchitis are very marked, and its diagnosis is easy, for the rapid enlargement of the body of the gland, its flattened oval form, and extreme tenderness, are very characteristic. The patient will complain of its weight, and if standing, he will probably assume the bent posture. The disease will be accompanied by extreme local tenderness of a dull, aching character, and pain which passes up the loins, round the hips, and often down the thighs. The scrotum will probably manifest some symptoms of inflammation, as swelling, redness, heat, and increased vascularity.

The constitutional symptoms will vary according to the susceptibility of the subject of the disease, in some cases being very severe, in others less so. They will be those of general irritative fever.

In exceptional examples of this acute affection there will be some effusion of fluid into the tunica vaginalis, but this complication is not so common after acute orchitis as after epididymitis, for reasons which have been already given.

As a rule, it may also be asserted that acute orchitis tends towards recovery, and seldom terminates in suppuration, unless it be of the tubercular form, or affecting very cachectic patients. In one known example it ended in gangrene of the part, the case having been recorded by the late Mr. Harvey Ludlow, in his unpublished Jacksonian prize essay. The case was under the care of Mr. Stanley, who was induced to cut into the gland, from the severity and obstinate character of the pain, and a black gangrenous cavity was exposed, which was seen after death to have occupied half the organ. I have the records of a case in which the patient stated that one testicle sloughed out after inflammation six months previously: the man came under treatment for inflammation of the other. The termination by suppuration, however, occasionally takes place, and numerous are the examples of this condition which I possess; they may at times end favorably, the abscess healing without any evil result, but too frequently the discharge of the abscess ends in what has been variously described as benign fungus of the testis, or

granular swelling, or hernia testis, the latter being the most correct and intelligible name, the affection being the result of rupture or ulceration of the tunica albuginea, and the gradual extrusion or hernia of the tubuli of the gland, the extruded gland being covered with granulations: the true nature of this affection was first described by Mr. Lawrence in 1808.¹

Acute orchitis as a consequence of parotiditis or mumps is a well-recognised affection, although it may be difficult to explain the connection between the two diseases; it is described by some surgeons as a kind of metastasis, but there are no published facts tending to support this view; no one, however, is disposed to deny that the one affection occurs in connection with the other. The disease is not usually very severe, and it commonly passes away with little treatment, leaving the testicle generally sound, few cases being recorded of atrophy of the glands attributable to this disease. The symptoms are precisely similar to those already described, and need no further illustration.

Treatment of Acute Orchitis.

The ordinary principles of treatment which are applicable to local inflammations in general are to be acted on in the treatment of this affection. Rest in the horizontal posture, with elevation of the parts and warm fomentations, are essential points for observation; leeching to the groin or local venesection, and saline purgatives with sedatives being the chief remedies. The disease has a tendency by itself to get well, and unless badly treated, or neglected, or attacking very cachectic subjects, this result will generally be attained. In extremely severe examples, where the inflammation runs high, tartar emetic in full doses is a most valuable drug; and colchicum, in half drachm doses of the wine, with saline purgatives, often acts like a charm. Opium in full doses may also be given where pain is severe and constitutional disturbance great. An acute attack, however, generally runs its course in about ten days, and seldom ends otherwise than well.

CASE 21.—*Rapid descent of the testicle from the abdomen;*

¹ 'Edinburgh Med. and Surg. Journal,' vol. iv, p. 257.

inflammation of the gland when passing down the inguinal canal.
—Robert H—, æt. 12, was brought to me at Guy's Hospital on June 20th, 1859, under the following circumstances :

The *right* testicle was not to be felt, having evidently not descended from the abdomen. The *left* had put in its first appearance at the external ring three days before his application to me, the boy having experienced pain in the groin, extending upwards towards the loin for two weeks previously. On walking into the room, it was at once observed that his body was bent unusually forwards, and that his movement was much restrained. On examination the testicle was readily felt in the left groin, having passed down the canal, and partially through the external ring. The gland was of a large size, remarkably tender, and was about the size of an egg. The horizontal posture was ordered to be maintained, with the thigh flexed, and cold lotion or ice applied. In three days the symptoms had somewhat abated, and at the end of the week the swelling was much less. On July 11th, or the twenty-first day after coming under observation, the testicle had passed the external ring, although resting close to it in the scrotum. In another week all pain had subsided; the testis was free, and the patient disappeared from observation, being quite well.

CHAPTER VI.

ON CHRONIC ORCHITIS.

OF the true diseases of the seminal gland chronic inflammation is the most common; and this is sometimes a consequence of the acute affection, often the result of an injury, but most frequently induced by some special constitutional condition, such as gout, tuberculosis, and more particularly syphilis.

The symptoms of chronic orchitis, when depending on the majority of these causes, are much alike; they differ only in some minor although important points; in the inflammation due to the syphilitic virus the symptoms are some-

what peculiar, and, as the diagnosis of the affection is important, it will receive at our hands a special consideration.

The subject will consequently be divided for consideration into the ordinary forms of chronic orchitis and syphilitic orchitis.

Symptoms and diagnosis of Chronic Orchitis.

The most special point in the natural history of chronic orchitis is its insidiousness; it comes on, unless following an acute attack, as a rule, so unmarked by any special symptoms, and unaccompanied by any pain, that in certain examples it is only by the increased size of the gland that the patient is induced to seek advice. In other cases, however, this swelling is accompanied by pain of a dull and aching character. In the early stage of the disease the gland may be more or less painful on manipulation, but in a more advanced condition, or in a very chronic case, no local pain will be experienced, even on somewhat rough manipulation, and in these examples even the ordinary testicular sensation will fail to be excited on firm pressure. The general appearance, also, of the testicle, the subject of this affection, is somewhat peculiar; it is not pyriform or globular, as in hydrocele and many other affections of the gland, but it has a peculiar flattened outline from side to side and a smooth even surface—unless the disease be associated with some effusion into the tunica vaginalis—when the tumour will naturally assume more the shape of a vaginal hydrocele. But the simple affection is rarely associated with such a complication, and when it is the fluid is, as a rule, secreted in very small quantities.

The epididymis, in exceptional examples, may be slightly enlarged and thickened, from the extension of the inflammation to its tissue; but when this does take place it will rarely be to any great extent.

There are seldom, also, any constitutional symptoms worthy of remark, except in cachectic and irritable patients, when the dull aching pain of the part will generally give rise to some general irritability of the patient's condition, and an anxious expression of countenance.

The Pathology.

The pathology of this affection is not difficult to understand, for it is precisely similar to that of any chronic inflammation of any other part. It consists of a more or less general infiltration of the gland with an organizable or organized material, this material separating the secreting tubuli and acting on them in different ways, according to the amount of fibrin poured out between them and the amount of pressure to which they are subjected. In some cases the inflammatory product is diffused very generally between the tubuli, in others it is deposited in irregular masses, but when the material poured out is very great, and is equally diffused between the meshes of the testis, that is, when the disease is extensive or of long standing, that condition of gland is probably produced which is indicated by an utter absence of the natural sensation of the organ on handling or on firm pressure, and in this stage short of the breaking up of tissue, there is the greatest anxiety for the subsequent maintenance of the integrity of the organ. Should the disease make a favorable progress towards recovery, and this inflammatory product be re-absorbed, the pressure will be proportionately removed from the delicate tubuli of the organ, and with this condition the natural testicular sensation will be restored—a point which should always be looked for in the treatment of these cases being one of great value, and indicative of recovery.

Should the inflammatory product soften down, as it will in the delicate and cachectic subject, suppuration will take place, and in proportion to its extent will the liability to a *hernia testis* be manifested.

And again, should this inflammatory product proceed to a more permanent organization, and contract, the delicate tubuli of the testicle will necessarily suffer in proportion to the extent of the part involved, and an atrophy of the organ will, as a consequence, be the result.

All these results are met with in practice to various degrees, and in greater or less frequency, the general condition of the patient having a more important influence in determining the

result than anything else, even more so than the treatment which may have been adopted; but I may add that there are few affections which are more amenable to good treatment than the one now under consideration.

When the disease is remarkably insidious in its advance, slow in its progress, and painless in its character; when the patient is cachectic and irritable, with an anxious countenance, disposition to a hot skin, and other symptoms of constitutional irritation; and, more particularly, when the disease ends in suppuration, as it in all probability will when coming on and progressing in the manner just indicated, it is reasonable to believe that the organ has been the subject of *tubercular mischief*, and that the inflammation of the part has been the means of hastening the disorganization of the testes; but it must be added that in these cases the tubercular affection is probably of the infiltrating or miliary tubercular form, and not of that crude nature which runs a different course, and to which attention will subsequently be directed.

In gouty inflammations of the organ the symptoms are not, as a rule, so chronic as they are in the former class of cases to which we have just alluded. Indeed they may more rationally be described as being of a subacute nature, for although generally coming on slowly, they are manifested with greater local tenderness and pain; the pain will also at certain periods be considerably aggravated, and most probably this will be at night. The disease has also a strong tendency towards recovery and not towards disorganization. Besides these symptoms, others indicating a gouty disposition will probably be present, an acidity of stomach, a loaded condition of the urine, and a more or less distinct history of gout. There will also be frequent nocturnal pains in the opposite testicle, of a darting character, leading the patient to fear a double attack, and when these pains occur they are valuable as diagnostic symptoms, in connection with others.

Cases of Inflammation and Suppuration of the Testicle.

CASE 22.—*Suppuration of the testis of an infant.*—Edwin A—, æt. 6 weeks, was brought to me on February 12th, 1862, with an abscess of the body of the right testis, which had been dis-

charging for one day. The symptoms had existed but one week previously. There was no history, or external evidence of an injury. Water dressing was applied, and on March 10th the child had recovered.

I looked upon this case as caused by an injury, probably a puncture by a pin, for it ran its course so rapidly, and was so unlike any idiopathic disease.

CASE 23.—*Inflammation of both testes ; suppuration of one ; recovery.*—John S—, æt. 29, came to me on July 25th, 1863, with disease of the right testis of two years' standing, and of the left of some days. The right had supplicated one year previously, and had been discharging ever since, the abscess evidently having connection with the centre of the gland. The organ was uniformly enlarged, about the size of an orange, and was almost painless. Tonics alone were given, the man's health being very bad, and fomentations were applied to the part. Under this treatment all swelling subsided, the abscess healed, and in two months he was discharged well.

CASE 24.—*Inflammation of the testicle, the result of an injury ; suppuration of the gland, and recovery.*—Samuel H—, æt. 25, applied to me, at Guy's Hospital, on January 5th, 1865, with an abscess in his left testicle of three days' duration, following a chronic enlargement of the organ of eight months' standing, produced by a blow. By tonics and water dressing to the part, which was well kept up, convalescence took place after one month's treatment.

Cases of Simple Chronic Orchitis.

CASE 25.—*Double orchitis without known cause.—Second attack two years subsequently ; recovery.*—Charles D—, a policeman, æt. 35, came to me at Guy's Hospital, on May 6th, 1861, with inflammation of both testicles, of five weeks' standing. It came on without any known cause. There was no evidence or history of syphilis. The testes were much enlarged, and appeared as smooth, even, and elastic tumours, flattened somewhat laterally. They were the subject of a dull aching pain, which was increased by manipulation. The man's health was

good. He was ordered to keep the parts well up by means of a bandage, and one grain of the iodide of mercury was given twice a day. On July 16th he was declared to be cured. He remained well till February 26th, 1863, the testicles appearing quite sound during the interval, when the right suddenly began to enlarge, and, as this continued for three weeks, he again sought my advice. The same treatment was adopted as had proved of value on the former occasion, and with speedy success, convalescence being established in three weeks.

CASE 26.—Chronic inflammation of the testicle with hydrocele—Three unsuccessful attempts to cure the latter by injection; recovery by treatment.—Peter D—, æt. 28, came to me on February 4th, 1865, with a large hydrocele of the left side, and chronic inflammation of the left testicle, of three or four years' standing. He had been tapped, and the hydrocele injected three times without benefit—once three and a half years ago, again on Dec. 7th, 1863, and for the third time on January 16th, 1864. There was no history of syphilis. I drew off the fluid from the tunica vaginalis, and found the testicle much enlarged, but with a smooth and regular outline—it was painless, and quite free from the natural testicular sensation on manipulation. Iodide of potassium, in three grain doses, was given three times a day, and one grain of the iodide of mercury every night. Under this treatment the disease gradually subsided. The hydrocele, which at first reformed, gradually disappeared, and on April 10th, two months after his application to me, he was pronounced well.

Symptoms and Diagnosis of Syphilitic Orchitis.

That syphilitic inflammatory disease attacks the testicle as it may any other gland or texture of the body, whether within or without, seems a tolerably well-recognised pathological fact at the present day, and to my colleague Dr. Wilks is due the credit of bringing this subject clearly before the profession. It remains for us now to compare our clinical observation with pathological knowledge, and to point out such symptoms as may aid in the recognition of syphilitic inflammation as affecting the seminal gland tissue.

But before doing so it may be well briefly to consider in what way syphilitic inflammation differs from others, as it will tend to help us in the special application of the subject to the local affection; and fortunately, for brevity, the points of difference are neither numerous nor deeply seated. The main one to which I shall allude is palpable and apparent, even to the most casual observer, for it is readily seen that in all syphilitic inflammations there is a marked tendency to the deposition of a product which rapidly undergoes fibrous changes, and tends to infiltrate the part affected with an organizable or organized material of a dense, firm, and fibrous structure. We see this in every tissue and in every stage of the disease. We see it manifesting itself primarily in the true infecting chancre by its almost cartilaginous hardness of base. We see it in the early constitutional symptoms of syphilis, in the different eruptions, and in the greater permanency of their skin staining; in the different affections of the mucous membranes in all their parts; in the inflammations of the eye, cellular tissue, periosteum, and bone. The pathologist sees it in the many changes found after death in the internal organs of the syphilitic subject; and the surgeon sees it, likewise, in the inflammation of the testes. For we find that in the syphilitic patient the testicle may at some period of the disease, and generally at a late one, become the seat of a syphilitic inflammation, which manifests all the peculiarities of this pathological condition. The affection is essentially a chronic one, as much so as in the other forms of chronic orchitis, but it is almost invariably confined to the body of the gland, and but rarely affects the spermatic duct. It is quite painless in its nature, locally and generally, the patient bearing free manipulation without flinching, and often thinking little about his disease, except from the increased size of the organ. The special sensation of the gland usually disappears at a very early stage of the disease, and there is rarely any constitutional disturbance accompanying its progress. It may or may not be associated with other symptoms of constitutional syphilis, but it usually appears alone.

The disease manifests itself locally in a special manner which claims attention. It usually affects both testes at dif-

ferent periods of its progress—rarely, however, both at the same time, and the body of the testis is the part involved. It is almost always complicated by the presence of a vaginal hydrocele, and this at times increases to a considerable size—much more so than in other forms of chronic orchitis. But the most characteristic point of all is the remarkably stony induration of the part and the peculiar irregularity of the outline of the gland, the surface of the swelling being very nodular, in some cases small fibrous projections from the body of the gland are distinctly visible, and in some, loose bodies are felt in the tunica vaginalis.

The diagnosis of this disease is not consequently difficult, for the symptoms are somewhat peculiar.

In the majority of cases the disease terminates by resolution, and apparently leaves the gland intact; but in many a gradual wasting of the testicle is the result, which terminates in atrophy, and, as a consequence, in sterility. In exceptional cases suppuration may take place with or without the hernia testis.

The disease, when apparently cured, has a remarkable disposition to return on the slightest provocation, even to many times, and this was well seen in a case which I shall relate.

In the Guy's Museum are several specimens illustrating this affection, and more particularly the fibrous degeneration or atrophy, to which allusion has been made.

On the Treatment of Chronic Orchitis.

There are few affections more amenable to treatment than chronic orchitis, particularly when taken early; and there are none which better prove the value of pressure and mercurials in procuring the absorption and disintegration of inflammatory products. In the common orchitis as well as in the syphilitic this opinion holds good; but, in the gouty, the treatment must be modified according to the special peculiarity of the patient. In a healthy subject, with good powers and an unbroken constitution, any form of mercurial may be administered, such as blue pill in four grain doses, or mercurial inunction, or the bi-chloride; but as the object of the surgeon is not to salivate, nor to bring the patient rapidly under

the influence of the remedy, but rather to procure a lengthened and equal action of the drug upon the local disease, the dose is required to be carefully regulated. In my hands the iodide of mercury given in one grain doses, with -five of Dover's powder, twice a day; has proved eminently beneficial, the testicle being well strapped up by common soap plaster.

In a more cachectic patient, in whom mercury may still be tolerated, the same treatment may be employed, although in smaller doses; and in others the mercurial may be locally applied in the form of an ointment, with strapping over. During this time tonics, as quinine and iron; may be administered, and good living and fresh air enjoined.

In certain examples, however, occurring in cachectic patients; it may not seem desirable to administer mercurials in any shape, and under such circumstances iodine may be substituted in the form of the iodide of potassium, in three or four grain doses, combined with half drachm doses of the syrup of the iodide of iron in infusion of quassia, three times a day. Locally, strapping, or rather pressure, should still be enforced. In hospital practice this treatment has been of great value. By such treatment, steadily persevered in for six or eight weeks, even the worst of cases may be expected to yield, the organ gradually becoming softer and more natural in sensation and shape, and at last resuming its normal condition.

In the gouty form of orchitis, which is to be recognised or suspected by the symptoms already quoted, the administration of colchicum acts very beneficially. It is to be given in small doses, and continued for several weeks. The acetic extract in half grain doses, with Dover's powder, is the best form, and with it a cure may generally be guaranteed. This form of disease is tolerably easily reduced when early recognised. It is more liable, however, to relapses, but less so than other forms to disorganization and subsequent atrophy.

Should there be sudden accessions of pain in the part, with other evidences of some fresh inflammatory attack, the application of a few leeches with hot fomentations is very serviceable. but these conditions are not common.

When vaginal hydrocele coexists with the inflamed gland,—frequent complication of the syphilitic variety,—it is a good practice to draw off the fluid, for it enables the surgeon to apply

his pressure with more certainty and better effect ; but it is of no use to attempt to cure the hydrocele itself, for it is to be remembered that the hydrocele is the direct consequence of the diseased testis, and that it is of little use treating the effect of a diseased condition and not its cause. Remove the latter, and the former will probably disappear. Cure the orchitis, and the hydrocele will generally go.

I have the records of a case which passed under my care for treatment, in which by some oversight this attempt had been made, and the hydrocele was tapped and injected with iodine on three different occasions, without success. Under the treatment adopted the chronic orchitis disappeared, and with it the hydrocele.

It is not always desirable, nor is it possible in a large proportion of cases, to keep the patient absolutely at rest during the process of treatment. In some examples it is advisable to do so as much as possible, particularly when the patient experiences more pain and inconvenience when walking or about, but in the majority of cases it is sufficient to keep the parts well supported in an elastic bandage, when strapping is not employed, and when it is, the same result is secured.

In the consideration of the treatment of this chronic orchitis it has been stated that a good recovery may generally be secured by the means which have been suggested, when the disease has been taken in hand at an early period of its existence ; that is, when not more than five or six weeks have been allowed to elapse.

But in cases of longer standing the prognosis is not so favorable, neither as regards the removal of the disease, nor the subsequent integrity of the part as a seminal gland, and these remarks more particularly apply to the syphilitic form of the affection. For, in these cases of long standing, the fibrinous matter has generally become too well organized for future absorption, and, when this is the case, the subsequent contraction of the organized product will almost to a certainty go on to the destruction of the semeniferous tubuli, and the production of an atrophy of the gland. In the Guy's Hospital Museum are several admirable specimens exhibiting this result.

In certain examples, again, of the chronic orchitis, whether

syphilitic or otherwise, suppuration and disintegration of the gland structure will take place. It may be suspected when the disease is of a very torpid character, when the pain is of a constant aching kind, and when all treatment fails to influence its course.

When it does take place, an early evacuation of the matter is the best practice, for a clean incision or puncture into the part often seems to prevent that destruction of the glandular structure, and of the fibrous covering of the gland, which usually precedes that troublesome affection, hernia testis.

Cases of Syphilitic Orchitis.

CASE 27.—*Congenital syphilitic orchitis, with "snuffles."*—Thomas M—, æt. 6 months, came under my care at Guy's Hospital, on February 4th, 1861, for syphilitic snuffles, the disease having appeared a few days after birth. At the time of birth, however, it was observed that both testicles were somewhat enlarged, and as they steadily increased in size, the mother drew my attention to the fact. I found the bodies of both glands unusually large, the right being about the size of a shelled, and the left of an unshelled almond. They were firm and smooth, and could be manipulated without pain.

The child otherwise appeared healthy. No history of syphilis could be obtained from the mother, who was a respectable woman; the characteristic snuffles, however, seemed sufficient to indicate the nature of the case. Grey powder was given twice a day, with tonics. After a month's treatment the snuffles had disappeared, the right testis suppurated and recovered, the left gradually subsided, and in May the case was reported as cured.

CASE 28.—*Congenital syphilitic disease of the testicle.*—T. P—, æt. 16 months, came under my care in September, 1863, with condylomata at the mouth, arms, and margins of prepuce. The right testicle was the size of a large almond, the left, apparently of its normal size, was situated at the internal ring. The disease of the testicle had existed from birth, the condylomata for fourteen months having gradually become worse.

The infant was the first child of a syphilitic father.

One grain of grey powder was given twice a day, and the child gradually recovered.

CASE 29.—*Syphilitic orchitis ; two distinct attacks at an interval of three years.*—James G—, æt. 30, came under my care in March, 1861, with chronic orchitis of the left testicle, of one year's standing. He had had a chancre, followed by sore throat and eruption, one year previously, for which he had been salivated. The testicle was very hard and nodulated, and perfectly painless even on free manipulation. On May 16th, the right testicle showed evidence of the same disease ; it was smaller than the left, and like it painless. The man had been out of my observation for several weeks, his work having called him away from town. His general health was not good. I had both organs strapped up with leather strapping. Ordered quinine three times a day, with one grain of the iodide of mercury every night. In one month the testicles had recovered their normal shape and sensation, and the man was declared well. In August 3rd, 1864, three years after this convalescence, he came to me with the same disease in the left testicle, which presented the same aspect as it did when first diseased. Under the quinine and iodide of mercury and strapping, it soon recovered. On November 20th, 1864, I saw this man, and he was quite well. Testicle natural.

CASE 30.—*Syphilitic orchitis sixteen years after chancre, and wasting of left testicle ; right orchitis complicated with hydrocele ; unsuccessful treatment of the latter by iodine injection ; cured by treatment.*—Ralph McM—, æt. 46, came under my care on November 2nd, 1862, with a large hydrocele of the right testis, and an irregular, nodular, painless enlargement of the organ. He had had a chancre and eruption sixteen years previously, for which he had been salivated ; nine years after this he had chronic inflammation of the left testis, which had subsequently wasted, and, when seen, it was a small fibrous mass, not half the size of the natural organ.

The right testicle had enlarged for eight months, and was complicated with hydrocele. He had been under the care of

a surgeon, who had tapped and injected the hydrocele five months previously without any benefit.

I tapped the hydrocele, and then felt the peculiar characteristic fibrous nodular enlargement of the testis. The organ was then strapped up, and a grain of the iodide of mercury given twice a day.

In five weeks a recovery was secured.

CASE 31.—*Hydrotestitis following a chancre after eight years ; cure by treatment.*—Edward S—, æt. 26, applied to me for advice on January 11th, 1864, with hydrotestitis of the left gland, of four months' standing. He had had a chancre eight years previously, and skin eruption, for which he was salivated, and he remained well till the present disease appeared. The hydrocele was tapped, and testicle strapped. The iodide of mercury was given twice, and iodide of potassium with the iodide of iron three times a day. In one week he was salivated slightly, and the pill was then given every other night. In a month he was declared to be cured.

CASE 32.—*Syphilitic orchitis ; failure of treatment by mercurial ointment locally applied ; recovery by other means.*—William P—, æt. 26, came to me at Guy's on January 26th, 1865, with syphilitic orchitis of the right testicle, of four months' standing. He had been salivated for a chancre and eruption six years previously, having remained well up to four months since. He had been under care at another place, and had had his testicle strapped up for three months, with mercurial ointment, without the slightest benefit. I gave him the iodide of mercury twice a day in a pill, and had the testicle firmly strapped up. In two months he was cured.

CASE 33.—*Syphilitic orchitis with hydrocele two years after chancre and eruption ; cure.*—Henry P—, æt. 22, came under my care on December 7th, 1863, with chronic orchitis and hydrocele on the right side, of ten months' duration. He had had a chancre two years previously, with eruption, but had never taken mercury. The tumour was very tense, but quite painless. The fluid was drawn off, and the indurated testis

readily detected; it was very hard and nodular, the body being covered with small fibrous projections. The natural testicular sensation was altogether absent, free manipulation causing no pain. Strapping was applied, and the iodide of mercury given in one grain doses twice a day. Quinine was also ordered, as the man's general condition was far from good. In six weeks he was reported cured.

CHAPTER VII.

ON TUBERCULAR DISEASE OF THE TESTICLE.

TUBERCULAR disease of the testicle may attack any part of the organ, that is, either the seminal gland or its duct. It may affect either of these parts separately or together.

It may show itself either in the form of an infiltration of the so-called miliary tubercles, or in the more distinct and usual condition of the yellow, cheesy, unorganizable material described as crude tubercle.

When appearing in the form of miliary tubercle, it is not characterised by any very definite symptoms: indeed, the infiltration of a gland with those small, gray miliary bodies seldom makes itself known by any visible signs, and it is to be suspected only when a rapid disorganization of the part takes place, after an attack of acute or chronic inflammation. For organs thus infiltrated have no power of resisting the inflammatory process, and, whether it be a lung or a testicle which is the seat of this affection, active breaking up of tissue generally takes place, with suppuration. We will therefore exclude from our present consideration those interesting cases. Pathologically, they are clearly to be recognised; but practically, they are only to be suspected when the result takes place to which I have already alluded.

The other form, however, of tubercular testis is characterised by more special symptoms and local conditions. It may

involve, as already stated, either the body of the gland or the epididymis, but, without doubt, the latter is its most frequent seat.

It is discovered, as a rule, accidentally by the patient, and frequently not until some secondary change in the structure is about to show itself.

It appears primarily as an indolent painless enlargement of the epididymis, and is described usually by the patient as a lump in the testicle, this lump appearing generally at the upper part. This symptom being, in all probability, the only one to which attention can be drawn; the surgeon will recognise it at once on manipulation, for the tubercular matter will feel as if some foreign body, as a pea, bean, or nut had been placed between the convolutions of the epididymis, or in the substance of the gland. It is not painful on pressure, nor in the inactive stage does it seem to cause any injurious influence on the organ, which is otherwise natural in its sensation and function.

In other cases it will appear as a general infiltration of the part involved. Should this be the epididymis, the part will be materially enlarged, indurated, and nodular, painless perhaps, and inactive, the body of the testes resting on the concavity of the affected portion, apparently sound. Should the body of the gland be the part affected, like symptoms will be present, the enlargement, however, showing itself in the secreting structure as an unequal and nodulated expansion of the part; the epididymis, or seminal duct, being quite distinct.

This inactivity of the disease does not, however, remain for ever—it may last months, or even years—but the time will come, in all probability, when the tubercular matter will begin to soften down, and thus excite some increased action in the parts around. It may be that it will be this increased action in the part which first draws the patient's attention to his affection, when the history of some previous thickening of the organ will be for the first time obtained.

When inflammatory symptoms are once developed, the disease will surely make rapid progress, and disintegration of this unorganizable tubercular matter will speedily follow, accompanied with suppuration.

In tubercular epididymitis—for such this disease may be named—local suppuration will soon appear, with the discharge of ill-formed pus and the *débris* of this tubercular material, showing itself as a curdy, friable, and granular material; sinuses are apt subsequently to form, which may go on discharging for a variable period, this point depending on the extent of the disease, and the amount of foreign material there is to disintegrate and soften down.

Should the body of the testicle be the part implicated, the same gradual softening down and suppuration will take place, and, too often, the formation of the hernia testis to which allusion has been already made. It is not, however, in every case of this disease of the testis that disintegration of the tubercular material is to be expected, with its accompanying suppuration and abscess, for in many examples no such result is to be found, this tubercular matter undergoing a gradual change, and showing itself after death as an earthy concretion. We see the same changes in the absorbent glands, in the lungs, and in other parts.

This tubercular disease of the testes may occur at any age, but seldom before adult life. The best example I have, however, ever seen was in a child aged two and a half years, whose testicle I excised in October, 1858, for tubercular disease of six months' standing; it had progressed very slowly, and had obtained a large size before suppuration occurred. Convalescence followed the operation, but the child subsequently died of general tuberculosis. The specimen is in the Guy's Museum, 2351⁷². The whole organ is nearly filled with scrofulous deposit, and the epididymis likewise. It is in this organ that we have the best opportunity of examining the true tubercular disease in its different stages, and of watching the various forms of its deposition, its changes, and its decay.

Treatment of the Tubercular Disease of the Testicle.

When tubercular material has been once deposited in a testicle, as in any other tissue, there are no recognised means by which the absorption of this material can be procured. It is true that it may remain, for an indefinite period, in an inactive or passive condition, and finally, by undergoing an

earthy degeneration, cease to trouble; nevertheless, it will still exist, ready, as it were, on the least disturbance, to light up some inflammatory action in the tissues around, and give rise to any or all of the various conditions just described.

Looking also upon the deposition of tubercle in a testicle as only one of the local manifestations of that general condition described as tuberculosis, and well illustrated in the case of the child already quoted, whose testicle I excised, it is clear that the principles of treatment should be of a general character to improve the health, and revive the powers of the patient by tonics; good living, good air, regular habits, and, what is of great importance, total abstinence from sexual excitement or gratification. Beyond that nothing can be done. Locally, the parts should be maintained as much as possible in a quiet condition, and cold sponging night and morning is of some service.

When inflammatory symptoms make their appearance, they will generally run their course, in spite of treatment; for, as already shown, they are usually caused by the breaking down of the tubercular deposit, and may be looked upon as one of nature's means for its elimination, and until this material has, consequently, been discharged, their subsidence is not usually to be looked for; fomentations in this stage are, therefore, suitable, and the application of water-dressing to the part, and support in a suspensory bandage, should be employed. When suppuration is nigh at hand, or has manifested itself, it is good practice to open the abscess freely with a lancet, for it saves time, and pain to the patient, and often prevents the formation of the sinuses which prove so troublesome. During all this time the health of the patient should be attended to by ordinary measures.

When the gland has attained large size, and is evidently destroyed by abscesses and disintegration of the infiltrating material, it may be excised, and more particularly if the hernia testis has appeared. Still the surgeon should not be in any hurry to operate in these cases, for the subjects of this affection being tuberculous, are not favorable to operate upon, and castration should consequently be only performed where a strong necessity exists, and the disorganized testes are a source of trouble and weakness to an enfeebled patient.

CHAPTER VIII.

ON HERNIA TESTIS.

THIS affection of the testis, which has been variously described as "granular swelling" and "benign fungus of the testis," has also more correctly been called hernia testis, for it is essentially a gradual protrusion of the substance of the gland through a rupture or ulceration of its fibrous envelope, the tunica albuginea. It may follow upon suppuration of the body of the gland, the result of an injury, or of an acute or chronic orchitis, or from the softening down of tubercular deposit. It seems to be the result of pressure, produced by the natural elasticity of the fibrous tunica albuginea, the testicle as it were being gradually squeezed out of its capsule and everted, the mass being eventually increased by the free granulations which spring up on its surface. The whole organ, or only a portion of it, may be thus extruded from its natural position, the extent varying according to the amount of disease and the size of the opening in the tunica albuginea and integuments. It must not be supposed, however, that this hernia testis is the necessary consequence of suppuration, or of disorganization of any portion of the gland, for such is not the case; in the majority of instances this result does not ensue, still in the minority it is certainly found, and in such requires consideration.

The diagnosis of the affection is not difficult, and, being once seen, should be consequently readily made out. It is a peculiar fungating-looking growth, with everted edges, and with a sinus in its centre generally secreting pus; it may be of variable extent, and also present a more or less irregular surface, and on examining its base, it will be seen to be in a measure pedunculated, the pedicle passing through an opening in the scrotum to the remains of the testicle. The margins of the opening in the scrotum will be seen to be generally free, although in some cases adherent to the growth. It may be slightly indurated from inflammatory thickening, but will never present the same aspect as a cancerous growth, for

which this affection may be mistaken, the term fungous testis having doubtless been the means of encouraging the great error of regarding this simple disease as a malignant one. The natural sensation of the gland remains, however, in those cases, and will be readily excited on manipulation. In cancerous disease no such natural sensation exists, and in doubtful cases this point is one of primary importance.

Treatment of Hernia Testis.

It may be safely stated that the majority of cases of hernia testis can be successfully treated by other less severe measures than castration—an operation which has been very generally performed for this affection by surgeons of the past generation. In exceptional instances it may be demanded, and I have the records of some eight or ten cases in which it has been successfully performed. The surgeon's object, it may be briefly stated, is to restore the extruded testicle to its natural place, and this may frequently be done by simple pressure, applied by fixing a good firm pad over the surface of the growth, and drawing well forward the margins of the ulcerated scrotum, fixing the whole in position by good strapping. In other cases, where the granulations are very exuberant, caustics may be used to hasten their destruction; and amongst the best is the old remedy of the red oxide of mercury, pressure being well maintained during its use. All minor cases, and many severe ones, may certainly be cured by these means, if steadily pursued and well applied. In the more obstinate and severe examples other measures must be adopted. The excision of the surface of the growth was formerly employed, and is now at times in the present day, but the practice, at the best, is a very doubtful one, for in the majority of cases to which it is applicable it would be tantamount to castration, as the fungating mass is as a rule composed of the everted tubules of the testes, covered with granulations, and consequently by this measure the tubules would be cut off and the gland destroyed.

Mr. Syme has described, however, in the 'London and Edinburgh Monthly Journal' for January, 1845, a plan of treatment which in these cases is very serviceable, although I

would add that it is only in quite exceptional examples that it can be called for. The operation consists in the elevation of the margin of the scrotum from the protruding mass, the reduction of the hernia testis within the scrotum, and the retention of the part in its natural position by a careful stitching together of the margins of the wound in the divided scrotum, careful bandaging and strapping being also required in the treatment of these cases. The granulating organ subsequently becomes attached to the inner surface of the scrotum, and a healthy action is subsequently restored. It is almost needless to add, that local and constitutional treatment for the original affection of the testis should be maintained at the same time.

CHAPTER IX.

ON CYSTIC DISEASE OF THE TESTICLE.

THERE is no disease of the testicle upon the nature of which there has been a greater difference of opinion than the cystic disease, and, although modern pathologists have devoted considerable attention to its investigation, the subject has not yet been brought out of its obscurity and made plain to the profession.

Sir A. Cooper, one of its original describers, looked upon it as a distinct disease of the secreting *tubuli* of the organ, and upon his authority this view was for a time generally received. But more recently, Mr. Curling's researches have tended to prove it to be an affection of the *ducts* of the testicle, and not of its secreting tubuli. "Why they alone," says Mr. Curling, "are subject to the morbid change, I admit my inability to explain." Whether this opinion be correct or not will be one of the subjects for present consideration; for I am disposed to think that it is not quite consistent with observed facts, although there can be no doubt that the rete-testis appears to be the seat of the disease in certain cases, while in exceptional examples cystic disease is undoubtedly formed independent of this structure.

It has been my privilege to examine many examples of this rare affection with some care, and in the main points of Mr. Curling's investigations I entirely concur, although I am not so sure of the special seat of the disease as he appears to be.

The disease is doubtless made up of cysts which are multilocular and of various sizes, from that of a mustard seed to a moderate-sized nut. These cysts are filled with a thin, serous, blood-stained, or glairy fluid, and at times they contain intra-cystic growths more or less pedunculated, made up of a delicate cellular structure, or of a distinct cell tissue. These cysts appear to be imbedded in a fibrous stroma, of different degrees of consistency and density—in some instances the fibrous elements being much more numerous than in others. In some it will be of a delicate nature, and more allied to the fibre structure found in the ordinary fibro-plastic growths of other parts. In certain examples the cysts appear to be clearly made up of dilated tubes, pouches appearing at their extremities or as lateral dilatations, these tubes being occasionally lined, as Mr. Curling was the first to state, with tassellated epithelium, and containing granular matter. I have failed, however, to find this in all the cases I have examined, and am disposed to look upon the presence of this tassellated epithelium as specially characterising a certain growth. Spermatozoa are invariably absent in the cysts or tubes of this affection. Enchondroma or bony material will almost always be found to exist; in some examples as small isolated patches, in others the cyst will be filled with such a material, and under such circumstances the growth might be described as an enchondromatous tumour, the cartilage being deposited in separate masses, these masses being divided by a fibrous stroma. The true secreting portion of the testicle will often be found pushed up into some corner of the tumour, or spread out over the cystic mass, or distributed between the cysts themselves, the tumour being invariably encysted in its own capsule; and, in rare cases, tumours of this nature will be found upon the cord and body of the testicle. The above facts, therefore, lead me to believe that the majority of these are new growths, following the great law which governs the development of all tumours, and partake of the nature of the

part in which they are developed, being more or less made up of the elements which naturally enter into its formation. The testis being essentially a tubular organ, all morbid growths developed in or near it have a tendency to assume a tubular or cystic character, this character varying in extent in different cases; the cystic or tubular, and fibrous or fibro-plastic elements being found in different degrees of perfection and quantity in different cases.

We may thus find in the testicles a tumour presenting all the elements of the fibrous or fibro-plastic tumour without cysts, whilst in another the same elements will exist in less proportions, the cystic formation more or less predominating; and in the majority of these examples the true structure of the testicle will be found spread out to a variable extent over the special capsule of the new growth. In other cases the new growth will be altogether free from any connection with the testis itself, and will be found growing from the cord. All these separate kinds of tumours, examples of which may be seen in the Guy's Museum, appear to me merely modifications of one kind of growth—the simple, or perhaps more correctly, adenoid growth of the testis. I am not prepared to say there is no true cystic disease of the rete testis, for I believe such an affection to exist, and am disposed to think that it may be pathologically recognised by the presence of the tessellated epithelium which is occasionally found within the cyst, or dilated tube, as originally described by Mr. Curling. I have seen this structure in one example, which was clearly situated in the position of the rete testis, with the testis spread out over it, but although I have looked for it in others, I have failed to find it. In a case related by Mr. Athol Johnson, in the 'Pathological Society's Transactions,' the same epithelium was found to line a cyst which was without doubt connected with the secreting tubuli. I would look upon this fact as consequently diagnostic between the two.

We thus see a close analogy between these tumours of the testes and others of the mammary gland, as well as of the ovary. We find in both the simple adenoid tumour, partaking more or less of the nature of the gland in which it is developed; and we find a true cystic disease of the gland itself, the latter being evidently a special affection of the tubes and

ducts of the mammary gland or testis, and not of the secreting structure; in both organs they are new growths, simulating, more or less correctly, the anatomical structure of the true gland.

Symptoms and Diagnosis.

Having dwelt as long as space will allow upon the special pathology of these interesting diseases, I will pass on to consider it in its clinical aspect, and to point out the symptoms which indicate its presence, and may help us to the formation of a correct diagnosis; and in doing so, I must premise that the development of the several forms of this cystic disease is to be recognised more by negative than positive signs, for they appear usually as painless enlargements of the organ; they are of slow growth, and unaccompanied by any symptoms such as attract attention, the patient seldom seeking advice until the organ from its size has become troublesome, or the dragging pain in the loins—which always exists when the testicle has become large and heavy from any cause—excites anxiety. The organ soon loses its natural shape, and assumes more the oval or pyriform outline of a vaginal hydrocele or hæmatocele. It will probably have a smooth and equal surface, and will be indistinctly fluctuating; it will not, however, be translucent. The natural sensation of the testis will not be experienced on manipulation, the absence of this natural condition appearing at a very early stage of the disease. The general health of the patient will probably be good, and there will be no evidence of any secondary glandular affection. The disease may generally be recognised by these conditions; the history of the case, the opacity of the tumour, and the loss of the natural testicular sensation, distinguishing it from hydrocele and hæmatocele; and when doubt exists, an exploratory function by the trocar and canula will decide the point, for in cystic disease a little bloody and glairy fluid will alone escape. From the inflammatory affections they may be diagnosed by the difference in the shape and feel of the tumour, for in the different forms of orchitis the organ maintains its flattened form from side to side, feeling hard, nodulated, and tender. In the cystic disease the tumour is generally more or less globular or pyriform, feeling smooth, elastic, and senseless.

The inflammatory affections are also often associated with a hydrocele, the cystic but rarely, if ever. In the former, also, both organs are generally affected sooner or later; in the latter, the disease only attacks one. Medical treatment does not appear to have any influence in arresting the development of the cystic disease, whilst in the inflammatory a good recovery may generally be secured by the use of proper remedies.

Treatment of the Cystic Disease.

There is but one remedy for this affection, and that is the removal of the diseased organ. No remedies seem to have the slightest effect in diminishing its size or arresting its growth; and excision should consequently be performed, the operation being, as a rule, most successful.

CHAPTER X.

ON CANCER OF THE TESTICLE.

THE testicle, like all glands, may become the seat of cancerous disease, both of the carcinoma-fibrosum or hard cancer, and of the carcinoma-medullare or soft cancer. It is rare, however, for the hard cancer to attack the testes, the majority of examples of cancer being of the soft or encephaloid kind. For one example of the hard cancer it is probable that at least twenty of the soft are met with in practice. In the different museums a few specimens may be seen of the former kind, and at Guy's several exist.

Cancer may attack this organ, likewise, in two forms—either as the tuberos cancer or the infiltrating. In the former class the disease appears either as an isolated growth, or as several distinct tumours separating the parts—then eventually coalescing into one mass. In the latter it appears from the beginning as the infiltrating kind, being more equally distributed between the tubes and ducts of the true secreting gland tissue.

This disease has one peculiarity which is worthy of notice, and that is the tendency there is in the malignant as in the simple affection of the organ to be accompanied by the

development of cysts, these cysts in the cancerous disease being filled with cancerous matter, in lieu of the glairy mucous or fibro-cellular intra-cystic growths which are found in the fibro-plastic, adenoid, or cystic diseases. In rare examples both conditions seem to coexist in the same organ; simple cysts, with the clear or blood-stained glairy fluid, existing in one portion, whilst in others these cysts are filled with cancerous material, and in a third, enchondromatous masses may at times be present.

The body of the gland is the part of the organ generally attacked, although the epididymis may be the seat of the disease; but when the latter is involved it is as a rule an extension of the disease from the body of the tumour—rare examples, however, existing which illustrate the primary affection of the epididymis. Cancer may occur at all ages, cases being related, by different authors, of this disease attacking infants even so young as seven months; and I have excised a cancerous testicle from a boy only two years old. The history of the case will be subsequently given.

Cancer may attack the testes of the old as well as of the young, and I have the records of cases occurring in men aged 56 and 62, respectively. The majority of cases occur, however, in young adult life, from 25 to 40.

I possess the records of sixteen cases, and I purpose to add them to the fifty-one examples originally tabulated by Mr. Harvey Ludlow, in his prize essay. The results are as follows:

Before the age of 5	.	.	.	.	6 cases.
From 15 to 20	.	.	.	.	2 „
„ 20 to 30	.	.	.	.	16 „
„ 30 to 40	.	.	.	.	27 „
„ 40 to 50	.	.	.	.	8 „
„ 50 to 70	.	.	.	.	8 „
					—
					67 „

Out of my 16 cases the disease had been growing for one year or less in 11, and in the remaining 5 cases three, three, four, four, and five years respectively.

It is rare, if not unknown, for both testicles to be the seat of cancer at the same time; I am not aware of any such example being on record. In 10 out of the 16 cases before me the right organ was attacked, in 6 the left.

Symptoms and Diagnosis of Cancer of the Testicle.

Cancer of the testicle may come on as insidiously as the simple cystic disease, but in general its growth is more rapid. It makes its appearance as a gradual enlargement of the body of the organ, and is seldom attended by any pain. There is also an early loss of the special testicular sensation on pressure or manipulation. The outline of the tumour is also smooth, semi-elastic, and fluctuating, although as the disease progresses its surface may become somewhat uneven or irregularly bossy, the tumour being harder in some parts than in others, the softer parts projecting. In the carcinoma-fibrosum, however, the whole tumour is hard and at times nodular.

It is very rare for the disease to progress sufficiently far for the skin and fibrous tunics to ulcerate, and for a bleeding fungus to form; the tumour must be very large for such a result to take place. The integuments are generally also free from the beginning—the disease being confined within its fibrous coverings. As the disease progresses and the health of the patient suffers, a general aspect may appear, indicative of exhaustion and some wasting disease, although it is not till a late period of this affection that any such symptoms are to be expected. There may be also more or less lumbar pain; when a constant aching exists, a suspicion of enlarged lumbar glands should be excited, and in certain examples these may be felt travelling upwards along the psoas muscle.

The inguinal glands are also occasionally enlarged from evident infiltration. It is believed by some surgeons that this complication does not appear till the scrotum is involved in the disease, but this is certainly not the case, for enlarged inguinal glands may appear at an early stage. It is the size of the organ which generally first draws the attention of the patient to the part, and the pain and inconvenience caused by its weight, which prompt him to seek advice.

The tumour is also opaque from the beginning, and is rarely, if ever, associated with any hydrocele—when it is, it is by a chance, the one affection having no direct relation to the other. In this respect it differs from the ordinary inflamma-

tions of the organ, such affections being very frequently complicated by the presence of a hydrocele.

The diagnosis of this disease is by no means easy, particularly in its early stage—indeed in many instances it is almost impossible to be certain.

The history of the case and the absence of translucency will prevent its being mistaken for a hydrocele. The hæmatocele has also a distinct and special history of its own, and the fact that the testis may be made out to exist in some portion of the tumour is a material aid to the surgeon in forming a correct opinion as to the nature of the case.

The tenderness of the organ, the nature of the pain, and shape of the swelling, are sufficient to indicate the inflammatory affection, and when fluid exists the diagnosis is rendered more plain, for a vaginal hydrocele rarely coexists with any other disease than the inflammatory, except to a very slight extent.

The simple cystic disease is of slower growth than the cancerous, and generally firmer to the feel; when punctured it yields also a glairy fluid, unlike the creamy material which comes away from the cancerous disease.

The subject of diagnosis, however, of all these growths will be discussed in a separate chapter.

Treatment.—The only treatment which gives any comfort to the patient is excision of the organ; it should be done, however, as early as the diagnosis can be made, for there is then less chance of the glands in the loin, &c., becoming involved. The general health must also be looked to with great care at the same time.

Medullary Cancer of the Testicle of a Child one year and a half old.

CASE 34.—A child, æt. 2, was brought to me at Guy's Hospital, in February, 1860, with a disease of the right testicle, of six months' growth. It had appeared gradually, and the enlargement was very slow for four months, when it increased very rapidly. The tumour was painless even on pressure; it was the size of a small egg, smooth in its outline and semi-elastic. The child's health was good. On April 3rd I removed the gland, and a speedy recovery took place.

The child remained well for nearly two years, when a return

of the growth appeared at the original seat of the disease; for three months this grew gradually, and when I saw him the tumour was about the size of a walnut, globular, smooth, and occupying the same position as the original testicle—it was fairly moveable and gave rise to no pain. No secondary enlargement of the glands could be detected. On August 6th, 1862, I excised the growth, but found a narrow neck of the disease dipping downwards into the perinæum, which could not be removed. The wound healed kindly, but the perineal tumour speedily increased to an enormous size, nearly that of the child's head, and in November, 1862, when I last saw the patient, he was evidently sinking from cancerous infiltration of the lumbar glands.

The tumour, on removal, was a splendid example of the medullary cancer, as it attacks the glandular portion of the testis. It seemed to have infiltrated the gland, no signs of the true structure of the organ remaining.

Medullary Cancer of the Testicle of rapid growth; excision and recovery.

CASE 35.—Henry R—, æt. 41, was admitted into Guy's Hospital, under my care, on April 3, 1861, with a disease of left testicle, of four months' standing. He was a strong, healthy-looking man, and a ship's carpenter by trade. He had always enjoyed excellent health up to four months before his admission, when he observed, without any known cause, some slight enlargement of the left testicle. The enlargement rapidly continued, and, when seen, the tumour was as large as a good-sized coconut—it was quite painless, and the natural sensation of the organ, on being pressed, had entirely disappeared. The growth was tense, smooth, and semi-elastic; it was very freely supplied with blood, large tortuous veins filling the scrotum. The inguinal and abdominal glands appeared healthy.

I tapped the growth with an exploring trocar and canula, blood freely flowing, and subsequently a little serum, but no glairy fluid as found in the cystic disease. Excision was subsequently performed, the whole cord being firmly ligatured. A good recovery ensued.

On making a section of the tumour it was found that the

disease had occupied the body of the gland, and no remains of healthy tissue were to be seen ; it was clearly a good example of the infiltrating medullary cancer of the gland, containing here and there some small patches of effused blood.

It may be remarked that, during the operation, a small cyst was opened in the anterior part of the tumour, apparently developed in the tunica albuginea.

CHAPTER XI.

ON THE DIAGNOSIS OF A SCROTAL TUMOUR.

IN the following chapter I propose to consider the subject of diagnosis of scrotal tumours as a whole, to describe the train of thought as it passes through the surgeon's mind in his attempt to diagnose a tumour of the testis, and to point out the special symptoms, or their combination, as they tend to indicate the presence of any special affection. Fully recognising the great difficulty so frequently experienced in forming a positive opinion as to the nature of a scrotal tumour, I believe that a near approximation to truth may generally be made when the history of the case, and its special symptoms, are carefully weighed, and I am not disposed to place amongst the impossible the diagnosis of a scrotal tumour, because occasionally great difficulty may be experienced, or it may be beyond our power to form any positive opinion upon the point. There are gradations of probability in all our conclusions as to the diagnosis of any disease, a certainty untainted by fallacy or doubt, rarely being obtained, and, I take it, we are as often correct in our judgment of the scrotal tumour as we are of any other affection.

The first point the surgeon has to decide, on being consulted as to the nature of a scrotal tumour, has reference to the question of hernia. Is the tumour connected with the testicle ? or has it passed down the direction of the cord from the abdominal cavity ? Should the surgeon be able to isolate the growth at its neck from the abdominal cavity by the

thumb and finger, the question is at once decided, for almost all scrotal tumours can be so isolated, it being quite exceptional for any to pass up the cord so far as the internal ring; rare cases of vaginal hydrocele, or hæmatocele, in which the tunica vaginalis is open up to the internal ring, forming the exception.

This important preliminary point having been decided, the nature of the growth claims our attention next.

Is it a hydrocele or hæmatocele? Is it the product of inflammation or of tubercular disease? Is it a new growth altogether, and if so, is it innocent in its nature or malignant?

Should the tumour prove translucent by transmitted light, the existence of a hydrocele may fairly be decided, although the form of this affection may yet be doubtful. Is it an ordinary vaginal hydrocele, or is it encysted? Should the tumour be large, even, and pyriform, and should the testis be found, either by means of manipulation or by the opacity displayed at one spot on transmitting light—at the posterior part of the tumour—vaginal hydrocele may be suspected; but should the testis exist in front or at one side, and should the tumour be small and have been of very slow growth, and should it be more or less globular or evidently multilocular, a cystic hydrocele may probably be diagnosed. The tapping of the tumour will, however, settle the diagnosis; for in vaginal hydrocele the fluid will be more or less straw-coloured and albuminous; in the encysted it will be thin, non-albuminous, pale, and probably opalescent, containing on microscopical examination granules and spermatozoa.

The presence of hydrocele is thus readily decided in the majority of cases, but in rare or old instances the tumour is at times opaque, thus complicating the diagnosis. The history of these cases will, however, tend to throw much light upon the point, for it will to a certainty reveal a disease of very long standing; the tumour will be probably painless and fluctuating, and the testis will be made out in its usual position at the posterior part of the sac. Should a doubt exist, a puncture with an exploring trocar and canula will decide the question, for in those cases fluid will be drawn off of a dark colour, loaded with cholesterine.

We will now pass on to the consideration of tumours which

are not translucent, and not hydrocele, and it is here that the surgeon experiences true difficulty in his diagnosis, for almost all the diseases of the testis are insidious in their growth, and most are painless in their development. The hæmatocele usually follows upon some strain or injury, and increases with tolerable rapidity up to a point, this change being accompanied with pain which soon subsides; it then becomes stationary as to size, and remains torpid for a variable period, when pain again appears, with other signs of inflammation. The presence of the testis is also to be made out by manipulation towards the posterior part of the organ. The surface of the tumour is always smooth, more or less oval or pyriform, and semi-elastic or fluctuating.

The inflammatory affections of the testis have a peculiar shape, being laterally flattened; they are usually accompanied at some period of their course with tenderness and pain, and often associated with fluid in the tunica vaginalis. In the syphilitic inflammation this fluid is often copious. Both organs are also generally involved, either together or at different times. The tumour is usually somewhat tender to the touch, and has a firm fibrous feel, unlike the semielastic and half-fluctuating sensations given by cystic or carcinomatous disease. In very chronic cases the testis may, however, be perfectly painless, and will allow of any amount of manipulation without distress; the natural testicular sensation will also have disappeared. In syphilitic disease the surface of the tumour will probably be irregular, with firm fibrous outgrowths in different parts and in the tunica albuginea.

In the tubercular affection of the epididymis or testis there should not be any difficulty in the diagnosis, for the tubercular deposit, as a rule, takes place unaccompanied with any pain, or any symptom beyond that produced by its deposition. When deposited in masses,—its usual manner,—it feels like some foreign body introduced into the body of the gland or of the epididymis; it is at first quite painless and unproductive of any symptoms, these only appearing when the material begins to soften down, and excite some inflammatory action in the parts around. This tubercular material may be deposited in one or more masses, subsequently, perhaps, coalescing into an

irregular induration. When suppuration takes place, the diagnosis is complete.

The cystic or simple tumours of the testis are painless from the beginning, painless as growths, as well as on manipulation, and are to be recognised by purely negative symptoms. They attract the patient's observation only from their size; can be handled without exciting pain, and are usually free from even the natural sensation of the organ upon pressure. They are slow in their growth, uniform in their outline, and more or less globular; are always confined to one gland, rarely accompanied with fluid in the tunica vaginalis, and on being punctured, emit only a more or less blood-stained glairy mucus.

The cancerous tumours of the organ are more rapid in their development than the cystic, a year's growth, as a rule, giving a large tumour; they are likewise painless, and readily allow of free manipulation. The natural sensation of the organ also soon disappears. They are unaccompanied with a hydrocele, and also involve only one organ. They have a more elastic and fluctuating feel than the cystic and the inflammatory enlargements, and when their outline is unequal or bossy, the projection is generally softer than the other portion of the tumour. An exploring needle, or trocar and canula, rarely, if ever, reveals the mucoid fluid so characteristic of the cystic or simple affections, but usually lets out blood or the thin creamy fluid so characteristic of a cancer. In the following table the chief points of difference in the several chronic affections of the testicle are clearly shown. I sketched it years since for my own purpose, and having found it useful, think it probable others may do the same in its improved condition.

Table of Diagnosis of Chronic

Symptoms	Hydrocele	Hematocoele	Chronic Orchitis
Condition of scrotum	Tense, usually transparent, fluctuating	Tense and elastic; not transparent; obscure fluctuation	Firm, and not elastic; not transparent; not fluctuating unless complicated with hydrocele
Outline	Smooth and uniform	Smooth and uniform	Smooth and compressed laterally
Position of testis	Posteriorly in vaginal; In front, or at side, or below in encysted	Posteriorly	Evidently an enlarged testis
Testicular sensation	Present on manipulation	Present on manipulation	Present at first; absent after long existence of disease
Rapidity of growth	Gradual, most so in encysted	As a rule sudden, and after accident, at times spontaneous	Slow
Size	To great dimensions in vaginal; moderate in encysted	Moderate	Rarely more than three or four times natural size
Form	Pyriiform or oval in vaginal; globular in encysted	Pyriiform, or oval	Oval with flattened sides
Pain	Very slight, if any, except when complicated with inflamed testis, and in acute hydrocele. Not increased on pressure	Painful at first, and at a later stage; not so during the intermediate	Dull pain, increased on pressure, except in very chronic disease
Manipular indications	Like fluid, vibrates on palpation	Firm and solid	Firm and solid, unless associated with hydrocele

Disease of the Testicles.

Syphilitic Orchitis.	Tubercular Disease.	Cystic, or Ædenoid disease.	Carcinomatous Disease.
Very solid, but not elastic or transparent unless complicated with hydrocele, which is very general	Indolent indurations in body of gland or epididymis, like foreign bodies. Towards the end these bodies soften and excite suppuration	Firm and elastic; insidious enlargement of gland; not translucent; indistinct fluctuation	A tense and firm enlargement of body of testis; not translucent. Indistinct fluctuation towards later stage; bossy outline; parts softer than others.
Irregularly nodular and very hard	The epididymis the most frequently involved	Generally regular, smooth, and elastic; rarely bossy	
In tumour	In natural position often half surrounded by epididymis as a half crescent	In tumour	In tumour.
Absent altogether, except in very early stage; returns also towards convalescence	Present	Present at first, but soon lost	Soon disappears.
Slow in the extreme, often hardly noticed	Slow at first; rapid afterwards, when softening and inflamed	<i>Unequal</i> ; slow at first, more rapid afterwards	Rapid, as a rule; slow only in the carcinoma fibrosum, which is very rare.
Moderate	Moderate	Rarely, but sometimes very large	Sometimes very large.
Irregularly oval and lumpy	Lumpy; uneven in all its stages	Oval with flattened sides. Smooth at first, subsequently bossy	Globular or pyriform. Smooth at first, subsequently lumpy, softest at these points.
Very slight, allows rough handling. Towards end of disease, on recovery, pain on pressure returns	Very slight pain or tenderness, except when pressed hard or inflamed	Slight when present; generally painless even on manipulation	Very slight even on free manipulation.
Very hard and irregular outline. Often hydrocele with small fibrous bodies in tunica albuginea	<i>At first</i> as if foreign bodies existed in the parts, lumpy. <i>At last</i> soft before suppuration	Firm and elastic, more so in one spot than another	Firm but elastic; softer on the bosses, when present.

Table of Diagnosis of Chronic

Symptoms.	Hydrocele.	Hæmatocele.	Chronic Orchitis.
Seat of its commencement	In <i>vaginal</i> , at the lower part of the tumour. In <i>encysted</i> , at the upper	—	Evidently in body of gland
Cause	No recognised cause	An injury or strain, rarely spontaneous	Injury; or idiopathic
Progress	Has a tendency to remain tranquil, and not to inflame, unless injured	Has tendency to inflame and suppurate, and not to remain tranquil for long	Slow growth; rarely, but at times ends in suppuration
Condition of cord	Free and healthy	Healthy	Often full and tender on manipulation
Results of tapping, exploratory or otherwise	Straw-coloured, serous fluid in <i>vaginal</i> ; limpid, opalescent in <i>encysted</i>	Blood fresh, or broken up with pus	—
Condition of inguinal and abdominal glands	Free and healthy	Healthy	Healthy
Complications	Inflamed testicle	None, unless hydrocele, or injured testicle	Occasionally with hydrocele
Organs involved	Occasionally double	Never double	Generally both organs, either separately or together

Disease of the Testicle.—Continued.

Syphilitic Orchitis.	Tubercular Disease.	Cystic, or Ædenoid Disease.	Carcinomatous Disease.
Always in body of gland	Generally in epididymis; occasionally in body of gland	In body of gland	Body of gland.
Constitutional syphilis, hereditary or acquired	Tuberculosis	Unknown	Unknown; occasionally on injury.
Essentially chronic; rarely terminates by suppuration	Very indolent and insidious; tends to inflame and suppurate after an uncertain period	Unequal; never inflamed	Rapid as a rule; rarely slow.
Free	Healthy	Healthy	Full; veins enlarged.
—	—	<i>Mucoid fluid, more or less blood-stained</i>	<i>Blood or creamy fluid, with characteristic cell-growth on microscopical examination.</i>
Generally indurated	Generally indurated	Rarely involved	Generally involved.
Hydrocele, almost always. Other syphilitic affections	Rarely with hydrocele. Disease in other parts of body	Rarely with hydrocele	Cancer on other parts; rarely with hydrocele.
Often both organs	Both organs, as a rule, involved	Always single	Single as a rule.

THE
STEREOSCOPE,
AND
STEREOSCOPIC RESULTS.

BY JOSEPH TOWNE.

SECTION VI.

OUR first section was given to the consideration of those experiments that appear to confirm the theory of the stereoscope, and which have doubtless gained for it great celebrity; subsequent communications have had reference to stereoscopic vision, and to results obtained by means of the stereoscope; we have also alluded to the construction of the instrument, as well as to the enforced position of the pictures with reference to the eyes; and we have expressed our conviction that the conditions essential to stereoscopic vision are incompatible with the laws of natural vision: but the phenomena of which we are now to treat differ widely from those referred to in our previous communications; and while they approximate more closely to natural vision, they are of a kind that do not admit of illustration by means of the ordinary stereoscope. We propose, however, to continue our observations in conjunction with this instrument, first, because it appears to us essential to the completeness of these inquiries that we should observe the relation of stereoscopic phenomena to those of natural vision, and also, because we believe that a correct analysis of the former would be a step towards a solution of the latter. The present section may be divided into three parts: in the

first division, attention will be given to the early experiments of Professor Wheatstone; in the second division, our observations have reference to solid bodies viewed in open space, the experiments being conducted by means of the adjustive stereoscope, an instrument which forms a convenient link, between the lenticular stereoscope and ordinary vision; in the third division, we relinquish the adjustive stereoscope, and pursue our investigations, by means very closely allied to natural vision.

Having in previous communications, considered the phenomena which may be said to have sustained the theory of the stereoscope; we may now turn our attention to those experiments, on which the stereoscopic theory is really based; for these, as yet, we have but very slightly touched. It is proposed, therefore, in the present section, to attempt a somewhat more careful analysis of the primary experiments of Professor Wheatstone, with a view to observing, how far they are consistent with the theory they were intended to support; and that we may further distinguish, between the phenomena of the stereoscope, and those of ordinary vision; subsequently we shall introduce a series of additional experiments, that tend not merely to exhibit the results of the stereoscope, in their true relation to natural vision, but having, as we think, a more direct bearing, upon the physiology of binocular vision.

The subject is thus introduced by Professor Wheatstone: "When an object is viewed at so great a distance that the optic axes of both eyes are sensibly parallel when directed towards it, the perspective projections of it, seen by each eye separately, are similar, and the appearance to the two eyes is precisely the same as when the object is seen by one eye only. . . . But this similarity no longer exists when the object is placed so near the eyes that to view it the optic axes must converge; under these conditions, a different perspective projection of it is seen by each eye, and these perspectives are more dissimilar as the convergence of the optic axes becomes greater. This fact may be easily verified by placing any figure of three dimensions, an outline cube for instance, at a moderate distance before the eyes, and while the head is kept perfectly steady, viewing it with each eye successively, while the other is closed. Plate XI, Fig. 13, represents the two perspective projections

of a cube; *b* is that seen by the right eye, and *a*, that presented to the left eye; the figure being supposed to be placed about seven inches immediately before the spectator It being (adds Professor Wheatstone) thus established that the mind perceives an object of three dimensions by means of the two dissimilar pictures projected by it on the two retinae, the following question occurs:—What would be the visual effect of simultaneously presenting to each eye, instead of the object itself, its projection on a plane surface as it appears to that eye?"

"Now if, instead of placing two exactly similar objects, the two perspective projections of the same solid object be so disposed, the mind will still perceive the object to be single, but instead of a representation on a plane surface, as each drawing appears to be when separately viewed by that eye which is directed towards it, the observer will perceive a figure of three dimensions, the exact counterpart of the object from which the drawings were made."

There are, we perceive, three distinct propositions included in the stereoscopic theory; first, that when the eyes converge upon a near solid object, dissimilar perspectives are projected upon the two retinae; second, that if two different perspective projections of the same solid object be placed each respectively before the eye by which it would be seen, in the direction of the optic axes, and at equal distances from the two eyes, the visual image will be referred to the point where the optic axes meet; and third, that, subject to the above conditions, the two dissimilar perspectives will be superposed and appear as one; the resultant image being the exact counterpart of the object from which the two dissimilar drawings were taken.

We may premise our observations, upon the experiments brought forward in proof of these propositions, and particularly with reference to the cube held at a short distance, and immediately before the eyes, by admitting, that, subject to the prescribed conditions, the result in this experiment will be precisely as described by Professor Wheatstone; namely, that different perspectives will be projected upon the two retinae, and also that these dissimilar perspectives, may, by means of the stereoscope, be superimposed and made to appear as one; but we demur to the conclusion, that this result can either

verify the theory it is brought forward to establish, or harmonise with the phenomena of natural vision.

We are now to analyse the above experiment somewhat more closely, and with this view, it is proposed to observe the cube under three distinct conditions ; first, with each eye alternately, as instructed by Mr. Wheatstone ; then with the eyes directed to a point beyond the cube, as in stereoscopic vision ; and lastly, with the eyes converged upon the cube, as in natural vision ; and we shall note the phenomena connected with each observation, that we may subsequently direct our inquiries, to the cause, or causes, connected with these respective phenomena : we view the cube in the adjustive stereoscope, in preference to holding it before the eyes, to secure accuracy of result ; the advantage thus gained is that of fixing the head and also the cube.

If, then, a cube be placed on the median line of the adjustive stereoscope, seven inches distant from the eyes, the eye plates being removed to prevent all obstruction to the rays of light, and viewed with the eyes alternately, as directed by Professor Wheatstone, it will be found that each eye respectively refers its image to the opposite side ; so that the image seen with the right eye alone appears on the left side, and that seen with the left eye alone, appears on the right side.

If the cube be viewed simultaneously with both eyes, the eyes being directed to a point more distant than the cube, as in stereoscopic vision, two images will appear ; if the right eye be closed, the image of the left side will be lost ; and if the left eye be closed, the image of the right side will be lost, showing that the images are reversed. If then, without moving the cube, the eyes be converged upon it, as in ordinary vision, say upon its centre, the cube will then be seen single and in its true position. Under these circumstances the right eye will see most of the right side, while the left eye will see most of the left side ; and how far each eye respectively obtains a more or less extended view of its own side, will depend upon the size and position of the cube. It is proved, then, by Professor Wheatstone, that if an object of three dimensions be viewed under the conditions of his first experiment, that dissimilar perspectives will be projected upon the two retinæ ; and subsequently it is shown, that these dissimilar perspectives, if viewed

in the stereoscope, may be superimposed, and made to appear as one.

We have, therefore, two distinct facts before us, and we propose to consider them each respectively; first with reference to the means employed in this experiment, and subsequently in connection with the theory which the resultant phenomena are adduced to verify. We have viewed the cube under various conditions, with each eye alternately; simultaneously with both eyes, the eyes being directed to a point beyond the cube; and lastly, with the eyes converged upon the cube, and we may now give our attention to the phenomena connected with these several conditions.

In viewing the cube, first with one eye alone, and then with the other eye alone, we remark, not only that different perspectives are received upon the two retinae, but we also note, that under these circumstances, the cube is referred by the right eye to the left side of the field, and by the left eye to the right side of the field; hence it becomes evident, when viewed strictly in accordance with the rules laid down by Professor Wheatstone for conducting this experiment, *that the cube cannot be seen in its true position.*

We next converge the eyes upon a point more distant than the cube, as in stereoscopic vision, and we apparently see two cubes, the image of the right side being seen with the left eye, and the image of the left side being seen with the right eye, showing that under these circumstances, each eye respectively refers its image to the opposite side of the field.

It remains that we note the phenomena connected with our third observation, namely, when the eyes are converged upon the cube; under these circumstances, that part only on which the eyes converge, will be referred to the axes of the eyes, *but laterally and over a certain space, the extent of which space will be modified by the position, size, and distance of the cube from the eyes, the images will still be referred to corresponding points of the retinae, and to this extent the eyes act conjointly*; but beyond the area which is covered simultaneously by both eyes, *there are portions of the cube, seen separately by each eye*, the right eye sees more of the right side, and the left eye sees more of the left side; in closing the left eye, we lose the left portion of the image, and in closing the

right eye, we lose the right portion of the image, and here, an important distinction may be observed, between the two former observations and the present. Under the conditions of the two former observations, each eye respectively, refers its image to the *opposite* side of the field, but in the present observation, so much of the picture as is proper to either eye, is seen by the eye of the corresponding side; this mode of viewing the object, excepting in the close proximity of the object to the eyes, represents natural vision.

It is to be remarked that under these various methods of viewing the cube, one condition is always present, namely, that a portion of the cube is seen by each eye, which is not seen by the opposite eye. *We inquire, then, on what parts of the retina, do those portions of the two dissimilar perspectives fall, that belong exclusively to the eye of the corresponding side?* And it is observable that when the cube is viewed with the eyes converged upon a more distant point, as in stereoscopic vision, that so much of each perspective, as belongs exclusively to the eye of the corresponding side, falls upon the *temporal* side of the retina; and when viewed with the eyes converged upon the cube as in natural vision, that so much of each perspective, as belongs exclusively to the eye of the corresponding side, falls upon the *nasal* side of the retina. It will here be remembered, that the *temporal* sides of the retina, refer their respective images to the *opposite* side of the field, and that the *nasal* sides of the retina refer their images, each respectively, to its own side of the field; hence the distinction between the resultant phenomena, obtained by viewing the object under the two conditions above referred to. Under the former arrangement, which is stereoscopic, the images are reversed, while in the latter, where the eyes are converged upon the cube as in natural vision, there is no reversal of the images; so far as the dissimilar perspectives fall upon *non-corresponding parts of the retina, the pictures are single, and to this extent, as visual impressions, they are distinct; but under these circumstances, there is no transposition of images, no disturbance to the harmony of vision. Thus viewed, every image is referred to its right place in the external field.*

Hence it appears that, subject to the various conditions

under which we have viewed the cube, and associated as each condition is, with its own special phenomena, that there is one essential feature, in which these several observations all agree; namely, that in every case, *those portions of the two dissimilar perspectives, that belong exclusively to the eye of the corresponding side, fall upon tracts of the retinae which refer their images in opposite directions?* and thus do we arrive at the point to which we have been leading. That the two eyes receive different perspectives under the conditions of Mr. Wheatstone's experiment there can be no doubt; but we point to the fact, that so much of these perspectives as belongs exclusively to the corresponding eye, falls upon tracts of the retinae, *that are distinct; distinct both in direction and also in colour sensation.* A finger of each hand, if applied to the two sides of the cube, would discriminate, were one side rough and the other smooth, and the mind would perceive the difference; still, the impressions upon the two fingers would remain distinct; so, too, do the retinae, under the conditions of Professor Wheatstone's experiment, receive different perspectives; *but so far as the two perspectives, obtained under the conditions of Professor Wheatstone's experiment, are individual to the eye of the corresponding side, they form single parts of the retinal picture; and to the extent that the two perspectives so obtained are dissimilar, they are, as visual impressions, separate, single, and perfectly distinct.*

In reflecting upon the phenomena, elicited by means of the experiment we have been considering, Mr. Wheatstone is led to inquire, "What would be the visual effect, of simultaneously presenting to each eye, instead of the object itself, a projection on a plain surface, as it appears to that eye? and the next step consists, in viewing these dissimilar perspectives in the stereoscope. The result is, that the two dissimilar perspectives are superimposed and appear as one; but before we can accept this result in support of a theory, which supposes a perfect mingling of the two pictures, it should be shown, that, in natural vision, images simultaneously falling upon the two temporal, or upon the two nasal sides of the retinae, can be referred to one place in the external field, and this we venture to state is impossible.

The superposition of pictures partly binocular, and partly

monocular, by means of the stereoscope, is perfectly explicable ; but so far as these pictures each respectively are individual to the corresponding eye, it matters not whether they fall upon the temporal, or upon the nasal sides of the retinæ ; in either case, it is impossible in ordinary vision, that they should be referred to the same place, or appear as one.

We think, therefore, that the phenomena on which the stereoscopic theory is founded, are incompatible with those of natural vision, and as it seems to us, they include an incongruity, fatal to stereoscopic consistency. Two dissimilar perspectives, partly binocular, partly monocular, and obtained by a method very exceptional, are by forced and artificial means, combined in one resultant picture, and beneath this process, if we mistake not, there lurks a fallacy, that underlies all the anomalies of stereoscopic vision, and repeats itself in every step. The foregoing remarks are, we are conscious, far from exhaustive, still they may serve to illustrate our observations upon stereoscopic vision, contained in Section III, and they also furnish the required link between our previous observations and others yet to follow.

Between the experiments about to be described, and those that have preceded them, there are, we have already intimated, several points of difference. Our previous experiments have been adapted to the lenticular stereoscope ; those about to be introduced, are all of them to be conducted without lenses ; several of them, with the eyes unassisted by any external appliances, while others relate to solid bodies, viewed in open space, and at various distances from the eyes. They cannot, therefore, any of them, be conducted by means of the ordinary stereoscope ; and our observations will be rendered more clear if we preface them with a few remarks.

Very early in these inquiries, we expressed our conviction, that some means less artificial, and less restricted than those furnished by the ordinary stereoscope, were required, for the investigation of the phenomena of binocular vision, and so forcibly were we impressed with this conviction ; that our investigations were suspended during some months, with the intention that they should not be resumed, until we could devise some method more complete, or at least better adapted

to our purpose, than any with which we were then acquainted. This our wish, has been realised in the construction of the adjustive stereoscope—the instrument figured and described in Section II; and we may avail ourselves of the present opportunity for stating, that although, with a view to facilitate publication, and from the circumstance of the lenticular stereoscope being in every house; we have adapted our former experiments to this instrument, still, with reference to some of these experiments, particularly those relating to colour, we have expressed ourselves, unsatisfied with this method of observation. And we may now add, that previous to publication, every result has been tested, by means of the adjustive stereoscope. Still the peculiar advantages of this instrument, remain to be developed, and they will appear in the experiments about to follow.

Let it be first understood, that on the bottom of the stereoscope are three lines, drawn in the following directions, namely, one straight line passing from a point opposite the middle of the forehead, and extending through the whole length of the instrument, to the point on which the eyes converge; this line will be referred to as the *median line*. There are two other lines, each respectively commencing from a point exactly opposite the centre of the pupil of the corresponding eye, and intersecting at the point on which the eyes converge; these lines will be referred to as the *visual lines*. We have yet to suppose a third line, passing from the centre of one pupil, to the centre of the other pupil; this line will be referred to as the *visual base*; and in describing the arrangement of the objects, for the following experiments, as also in remarking upon the resultant phenomena, we shall have frequent occasion to make use of these terms. The median line, passing from the middle of the visual base, and extending to the point on which the eyes converge; the visual lines, each respectively, passing from the centre of the corresponding pupil, to the point where the optic axes meet; and the visual base, an imaginary line joining the two pupils.

The experiments we are about to introduce, may be divided into three groups. The first group will comprise a series of observations, relating to the visible direction of the lines we have described; the second group has reference to the visible

direction, of objects placed at different distances from the eyes, but arranged in strict accordance with the direction of these lines, and viewed with the eyes converged; our third group will include several experiments, in many respects analogous to those that precede them; the lines will be again viewed, and the objects will be arranged in the same relation to the lines, but between the two sets of experiments, there will be the following essential modifications; in the two former groups, all the observations are conducted with the eyes *converged*, while in the third group the observations are made with the *optic axes parallel*. And in these experiments, we dispense with all external appliances, so far as relates to the visual organs; the only condition being, that the eyes shall be directed immediately forward, and to a distant object.

For our first three experiments, we require a piece of flat board of convenient width, and about twenty inches in length; the board is to be covered with white paper, and on this paper, are to be drawn two lines in the direction of the visual lines; these lines are to intersect eighteen inches distant from the eyes; the line for the left eye is to be black, that for the right eye red; and a pin is to be inserted where the lines meet. (See Fig. 1.) These arrangements being complete, the end of the board distant from the pin, on which the eyes are to converge, is to be placed upon the bridge of the nose, taking care, that the visual lines are exactly opposite the centres of the two pupils; the distant end of the board is to be slightly raised; the board being thus adjusted, the eyes are to be steadily directed, *not to the lines*, but to the *pin*. The apparent result will be, a single line passing in a direction from the middle of the forehead, to the point of convergence; the resultant line being a combination of the two visual lines. And it may be further observed, that the line of the right eye is referred to the left side, while the line of the left eye is referred to the right side. This will be very apparent, if the two lines be drawn in colours that do not harmonise; the lines will not then blend and appear as one, but they will appear as two parallel lines lying side by side; and under these circumstances, it will be evident that the line of each eye is referred to the opposite side of the field. In the experiment we now describe, the line for the left eye is black, that for the right

eye red; and if the right eye be closed, it will be seen on opening the eye quickly, that the red line approaches the centre from the left side of the field, and in like manner, the black line will be seen, to approach the centre from the right side of the field, showing that the line of each eye respectively, is referred to the opposite side of the field. (See result, Fig. 1.) In the figure the lines are represented just previous to their union, and they may be seen in this relation when viewed as described.

If under a similar arrangement, the median line be viewed with the eyes steadily directed to the pin, the apparent result will be two lines, springing one from the centre of each pupil, and intersecting where the optic axes meet; if either eye be closed, the line of the opposite side will be lost; hence it is evident, that the line of the right eye is referred to the left side of the field, and that of the left eye is referred to the right side of the field. (See Fig. 2, and result.)

For the next experiment, it is required that all three lines, that is, the two visual lines, and the median line, should be simultaneously presented to the eyes; the visual lines are to be black, the median line is to be red; under this arrangement, and being viewed as in the previous experiments, with the eyes steadily converged upon the pin, the apparent result will be, two red lines, passing each respectively from the centre of the pupil of the corresponding side, to the point of convergence, with a single black line, springing from the middle of the visual base and passing to the point where the red lines meet; in short, the red lines appear in the same places, as those truly occupied by the black lines; and it is to be remarked, both with reference to the red and also to the black lines, that the visual images are referred to the opposite sides of the field; that is, the image of the right eye appears on the left, and the converse. (See Fig. 3, and result.)

Our next experiments relate to solid bodies, placed at various distances from the eyes, and arranged in strict accordance with the direction of the lines; and in each experiment, we suppose a pin to be inserted on the median line, distant eighteen inches, for the eyes to converge upon. The objects used are of two kinds, namely, ivory discs, about the size of a threepenny-piece, and spherical bodies about the size of a small pea; the

discs are mounted upon wires, to give them the desired elevation with respect to the eyes, the wires being sharp at their points, to give facility for fixing them in position; for the spherical bodies we use ivory beads; these beads when viewed lie upon the bottom of the stereoscope, and are kept in position by means of small pegs; each disc is marked with a *single* diagonal line, and the success of these experiments, depends in great measure, upon the accuracy observed in the arrangement of the objects. For the first experiment, eight beads are to be placed upon the median line, with a space of one inch between each two, the first bead being seven inches from the eyes; in addition to the beads, there is also to be one disc placed in the direction of each visual line; the discs require to be sufficiently raised, to bring them opposite the axes of the eyes, and they are to be seven inches distant from the eyes. (See Fig. 4.) The eye-plates must be so adjusted, that if either eye be closed, the disc opposite to the open eye, and also the pin on which the eyes are to converge, come into view; if, under these conditions, both eyes be opened, and converged upon the pin, the apparent result will be, a single disc marked with a cross; *the visual image being referred to the median line*; there will also appear two rows, eight in each row, of small spherical images; these spherical images result from the eight beads placed on the median line, those of the right side being seen by the left eye, and those of the left side being seen by the right eye. The central image of the disc, is a combination of the two discs presented to the eyes, and that the two discs are combined in the resultant image, is clear from the fact, that the resultant image is marked with a *cross*, while the two discs presented to the eyes, are marked each respectively with a single diagonal line. (See result, Fig. 4.)

We next place three pairs of discs in the direction of the visual lines, at the respective distances of nine, ten, and eleven inches from the eyes, each disc being marked with a single diagonal line; it is required that the discs should be so disposed, that they do not stand one before the other, and this may be avoided, by slightly raising those most distant from the eyes, while those nearer to the eyes, may be placed somewhat lower; under these circumstances, they can all be seen at the same time, and the arrangement we describe, does not interfere with

the integrity of the result. In addition to the discs already named, there are also to be three beads placed upon the median line, each bead respectively being on a plane horizontal to the two corresponding discs (see Fig. 5); the beads are to lie upon the floor of the stereoscope.

In adjusting the eye-plates, care must be taken, that when viewing the objects with either eye alone, one half only of the visual images comes into view; these conditions being secured, if both eyes be opened and directed to the pin, the apparent result will be, three rows of discs, each row containing three images, one row appearing in the direction of the median line, and two rows appearing laterally, one row to the outer side of each visual line; the images referred in the direction of the median line are marked with *a cross*, each image respectively being a combination of the two corresponding discs presented to the separate eyes. The lateral groups of discs consist of single images, and are seen by the eye of the opposite side. Two rows of beads, three in each row, also appear; these are referred in the direction of the visual lines, and are likewise seen by the eye of the opposite side. (See result, Fig. 5.)

The respective distances of the several objects from the eyes, is well defined, and all that we have described can be distinctly seen at the same time, while the eyes are steadily converged upon the pin at eighteen inches.

Experiment 6 includes, in addition to two stereoscopic pictures, a series of objects so placed, that when viewed they simultaneously fall, some on corresponding, and others upon non-corresponding parts of the retinae. The arrangement may at first sight appear somewhat complicated, but on referring to fig. 6, the description will, we think, be quite intelligible; and we take this opportunity for stating, that in the figures, the objects are all represented as though they were lying upon the *floor* of the stereoscope: it will be understood, however, so far as relates to the discs, and also to the stereoscopic pictures, that when viewed, they are placed vertical to the eyes, it is the beads only that lie on the floor of the instrument. For this experiment two grooves are required, one on either side of the stereoscope, for the purpose of receiving a slide; the grooves must therefore be equidistant from the eyes, and they are to stop half an inch before they reach the bottom of the instru-

ment, so that when the slide is introduced, there will be a space of half an inch, between the lower edge of the slide and the floor of the stereoscope. The slide is to be eight inches from the eyes, a disc is to be placed on each visual line, one inch in advance of the slide; beyond the slide, and on the median line, there are to be five beads, leaving a space of one inch between each two of the beads, the first being nine inches from the eyes. The slide yet remains to be described; and we may premise our description by stating, that it is intended to represent an ordinary stereoscopic slide; the picture for each eye represents two arrows, the width of each picture must agree with the space between the two visual lines, and the pictures are to be so arranged that, when placed in the stereoscope, the centre of each picture is exactly opposite the axis of the corresponding eye, this provision being in strict accordance with the rules laid down by Professor Wheatstone. We must further add, that the arrows are drawn upon the lower margin of the slide, and will therefore, when in position, be slightly more than half an inch above the floor of the stereoscope. The relation of the several objects now described, commencing with those nearest to the eyes, will therefore be as follows: one bead upon each visual line; a picture representing two arrows, the centre of the picture opposite the axis of the corresponding eye, and more distant than the slide; five beads upon the median line. Hence it will be apparent, these objects being viewed with the eyes converged upon the pin at eighteen inches, that the stereoscopic pictures are a little above, and the spherical bodies a little below the access of vision. (See Fig. 6.) The visual result is as follows: the stereoscopic pictures are perfectly superimposed, the two discs placed upon the visual lines, and in advance of the slide, are referred to the median line, and appear as one; while the beads placed beyond the slide, upon the median line, are by each eye respectively, referred to the direction of the visual line of the opposite side. It is essential to this result that the eyes should be steadily converged upon the pin. (See result, Fig. 6.)

For experiment 7, we obtain a slip of ivory about one quarter of an inch in depth, this slip of ivory we divide by a vertical line into two equal parts; on the right side of this line we make three crosses, and on the left side we make three circles, so that

the entire picture consists of three crosses on the right side, and three circles on the left side, the two groups being divided by a vertical line ; this slip of ivory is to be mounted upon a piece of wire, so that when placed in the stereoscope it may be opposite the axis of the eye, the wire being fixed into the ivory exactly under the vertical line dividing the two groups of images ; the sharpened end of the wire is then to be inserted into the floor of the stereoscope, in the direction of one of the visual lines, say that for the right eye, and at about nine inches distant ; care is to be taken, that the centre of the picture is exactly over the visual line (see Fig. 7), the eye plates are to be adjusted, and the left eye closed. If, under these conditions, the right eye *be directed to the pin at eighteen inches*, the result will be, that the centre of the picture placed on the visual line for the right side, will be referred to the median line, and appear on a plane horizontal to its true position, so that the wire on which the picture is supported, will cover the pin to which the single eye is directed ; or if the wire on which the picture is supported be thinner than the object to which the eye is directed, for example, if the latter be a small peg, then the wire supporting the picture will apparently stand before the peg to which the eye is directed, a portion of the peg being seen on either side of the wire on which the picture is supported. Or again, if the pin to which the eye is directed be somewhat higher than the picture presented to the eye, then the lower portion of the distant pin will be covered by the wire on which the picture is supported, while the head of the distant pin will be seen above, and *exactly agreeing with the centre of the resultant image*.

The apparent result being, a picture consisting of three crosses on the right side, and three circles on the left side, with a vertical line in the centre, the vertical line of the visual image, appearing exactly over the median line of the stereoscope. (See result, Fig. 7.)

This brings us to the third group of experiments ; our observations hitherto, with the exception of the last (which relates to monocular vision), have had reference to phenomena, connected with *convergence of the eyes* ; and it is evident that all the arrangements in the foregoing experiments, have been made in accordance with this condition, but the results now

before us, suggest the idea, that some of the phenomena which have been regarded as inseparable from convergence, may possibly be independent of this condition ; hence the question, may not these phenomena occur, when the optic axes are parallel? and the experiments we are about to submit, bear immediately upon this point. Having obtained a smooth flat board, six feet in length, and covered it with white paper, we ascertain the exact distance, between the centres of the two pupils while the eyes are directed to a distant object ; and then, through the whole length of the board, we draw in black ink two straight parallel lines, the distance between these lines, agreeing *exactly* with the distance between the centres of the two pupils of the *individual observer*. At one end of the board, and exactly midway between the two lines already described, a piece of the board is to be scooped out, to admit of being adapted to the bridge of the nose ; a provision which is intended to secure a true position for the board with reference to the eyes, when viewing the lines and other objects. To complete the arrangement, two sides are required, about four inches in height ; and in each of these side pieces, near to the end most distant from the eyes, there is to be a groove for receiving a stereoscopic slide ; the sides are to be painted black, and the groove so arranged that the slide, when introduced, may not rest upon the bottom board, but that it may be supported at a point one or two inches above the board. All being thus prepared, we rest the distant end upon a window sill, and place ourselves somewhat lower, so that when the proximate end of the board is made to rest upon the bridge of the nose, the distant end will be slightly raised ; these conditions being secured, we direct our eyes, not to the lines, neither to the board, but to some remote object, for example a tree, say 500 yards distant, when we immediately see one single line, apparently springing from the middle of the visual base, and passing up the centre of the board through its entire length ; but if we look upon a nearer object, say for example upon a window at twenty yards, and direct the eyes to the intersection of two of the frames, *the line apparently passing up the centre of the board, appears as two ; and when we again direct our eyes to the more remote object, the line is again seen single.*

We next, through the whole length of the board, and precisely midway between the two black lines already described, draw a single red line, making in all three parallel lines, two black and one red, the space between the two black lines, being equal to the distance between the centres of the pupils. If these lines be viewed simultaneously, and under circumstances identical with those already described, the apparent result is one black line passing up the middle of the board, with two red lines springing each respectively from a point opposite the pupil of the corresponding eye; these three lines running parallel through their whole length, the single black line is a combination of the two visual lines, each eye respectively referring its image to the centre; the two red lines result from the median line, this line being seen by both eyes, and by each eye respectively, referred in a direction agreeing with the axis of the opposite eye.

It is important to notice to which eye, these lines individually belong; and first, speaking of the red lines, we remark that if the *right* eye be closed the line of the *left* side is lost, and if the *left* eye be closed the line of the *right* side is lost. The black lines are both referred to the centre, and they are so, whether viewed simultaneously with both eyes, or with each eye separately, *but it is to be remarked, that the line of either side belongs to the eye of the corresponding side.*

Our next step, is to arrange several objects at different distances, and in various directions with reference to the eyes, as in Experiments 4 and 5. These objects being disposed in strict accordance with the *parallel lines*, as in our previous experiments they were with reference to the *convergent lines*. Without dwelling at length, upon the details of these somewhat complicated experiments, we may at once state, that the results obtained with optic axes parallel, so far as relates to the visible direction of the images, are identical with those obtained, in Experiments 4 and 5, with the optic axes converged.

For Experiment 8, in addition to the visual lines, we introduce a stereoscopic slide. The slide is to be prepared in accordance with the rules laid down by Professor Wheatstone; therefore, the centre of each picture must be opposite the axis of the corresponding eye; and since in this experiment the

optic axes are parallel, it follows that the distance between the centres of the two pictures, must correspond with the distance between the centres, of the two pupils of the *individual* observer, when the eyes are directed to a distant object, there should be a mark on the lower margin of the slide to indicate the centre; which mark being placed precisely over the visual line, will ensure the centre of each picture, being opposite the axis of the corresponding eye. The slide we have used represents two camels, one for each eye; the animals are painted upon glass, with a view to avoiding as far as possible, all obstruction to the light, excepting in the direction of the pictures. And we may here state that the experiments we are about to describe, require that the eyes should be *actually* looking into *space*, and *directed to a distant* object; since the results cannot be satisfactorily obtained, by a forced or artificial adjustment of the eyes. If, under the arrangement we have described, the slide be fixed in the groove and viewed with the eyes directed to a distant object, which may be seen between the lower edge of the slide and the bottom board, the slide being a little above, and the board a little below the axis of vision; the object to which the eyes are directed falls on the central parts of the two retinæ (see Fig. 8), the apparent result will be a single line up the middle of the board, and at the distant end three images of a camel. (See result, Fig. 8.) The image of the right side will be lost if the left eye be closed, and the image of the left side will be lost, if the right eye be closed; but if the eyes be directed *to a nearer object*, the line apparently passing up the middle of the board, and resulting from a combination of the two visual lines, will be seen *as two lines*, the separation of the lines commencing at the distant end; *and simultaneously* with this apparent splitting of the median line, *the central image of the camel will disappear*.

Without disturbing the slide, we next introduce a septum, which is to be painted black, and to commence at the end of the board near to the eyes, from a point opposite the middle of the forehead, and to extend to within six inches of the slide, thus completely separating the two eyes. (See Fig. 9.) Viewed simultaneously with both eyes, the eyes being directed to a distant object, the result is a single camel, the visual

image being a combination of the two pictures seen by the separate eyes. (See result, Fig. 9.) The binocular image appears as though at the end of a long vista, this vista being bounded on the right side, by a shadowy image of the septum seen by the left eye, and on the left side, by a like image of the septum seen by the right eye. The lateral images of the camels do not, under these circumstances, appear; and they are lost because the rays which would pass from the picture of either side to the opposite eye, are cut off by means of the septum.

We now remove the septum, and introduce a slide having but one picture; the single picture is to be placed exactly opposite the axis of either eye, say that of the right eye (Fig. 10), the eyes, as before, being fixed upon a distant object, and directed between the lower edge of the slide and the bottom board, an arrangement which places the picture of the camel above, the lines below, and the object viewed in the direction of the axis of vision. Thus viewed, the apparent result will be a single black line passing up the centre of the board; there will also appear two images of the camel, one central and one lateral. If the right eye be closed, the *central* image is lost; if the left eye be closed, the *lateral* image is lost. The former image falls on the central part of the right retina, and the lateral image upon the temporal side of the left retina. It is to be observed that the visible direction of the image falling on the *central* part of the retina, is *central*, the centre of the picture appearing exactly over the median line.

That the general aspect of the experiments now before us, is one of apparent consistency, will probably be conceded; and when submitted to closer examination, they will, we venture to think, be found not only to agree with each other, but also perfectly to coincide with those we have previously adduced. In the first experiment of the group now proposed for observation; we present to the eyes two lines, passing in a direction from the centres of the two pupils to the intersection of the optic axes (Fig. 1); these lines being viewed with the eyes converged upon a pin placed on the median line, the apparent result, is a single line springing from a point opposite the

middle of the visual base, and extending to the point on which the eyes converge. (Result, Fig. 1.)

We next present to the eyes, a single line springing from the middle of the visual base and passing to the point on which the eyes converge (Fig. 2). The apparent result is, two lines springing from the centres of the two pupils, and intersecting at the point of convergence; in both experiments the line of the right eye is referred to the left side, and the line of the left eye is referred to the right side. (Result, Fig. 2.)

It may be observed, that the method we have adopted in viewing these lines is not that of looking directly up them, under these circumstances they would scarcely come into view; for example, if a cedar pencil be held exactly in the direction of the visual line for one eye, the other eye being closed, the pencil will appear as a round spot, but if the distant end be either raised or depressed, a correct idea of the direction, and also of the length of the pencil, will be obtained. And that we may gain a distinct view of the lines, we depress the proximate end of the board, and rest it upon the bridge of the nose, thus bringing the lines near to but somewhat *below* the eyes, the eyes being converged upon a pin inserted upon the median line; thus viewed the image of the pin on which the eyes converge falls on the axes of the two retinae, while the lines, as they approach nearer the observer, are referred, each respectively, to the upper part of the corresponding retina; and the visual result will be the same if the board be placed upon the brows, with the distant end depressed. Thus viewed, we bring the lines near to but somewhat *above* the eyes; under these circumstances, the point on which the eyes converge falls as before, in the axis of vision, while the lines are referred to the *lower* parts of the retinae.

It is therefore proved, by our first experiment, that two lines passing in the direction of the optic axes, if viewed with the eyes converged upon an object placed upon the median line, will, through their whole length, be referred to the median line; and also, that the line of each eye respectively will appear on the opposite side. And by our second experiment it is proved that a line passing in a direction from the middle of the visual base, to the point on which the eyes converge, and viewed under similar circumstances, will appear as two con-

verging lines, the line of the left side being seen by the right eye, and the line of the right side being seen by the left eye, these two lines, each respectively, apparently passing from the centre of the pupil of the opposite eye, and converging until they intersect at the point where the optic axes meet. *The plain inference from these facts would appear to be, that if the lines viewed under the circumstances we have described be, through their whole length, referred in the directions we have indicated; so, too, must any objects placed in the direction of these lines have the same visible direction as the lines.*

We must here state that the two experiments to which we have been alluding, namely, that relating to the visible direction of the visual lines, and that relating to the visible direction of the median line, are not now communicated for the first time; they may be found in an essay entitled 'Single Vision with two Eyes,' published by Dr. Wells in 1828. The observation that suggested these experiments was, we are informed by the author, the result of chance, and the experiments were conducted by means of wires and threads, but they are identical with those we have described, and it is remarkable, that these striking experiments should have remained, we believe up to the present time, unchallenged, and unanswered—unnoticed they have not been. Professor Wheatstone alludes to the 'Essay on Single Vision with two Eyes,' and does justice, in general terms, to the value of the observations it contains; but the experiments to which we allude, appear to have received but little consideration from the author of the stereoscope; they are, in fact, dismissed almost in two words, being regarded as "anomalous, and individual." That Dr. Wells, after having so well observed the phenomena connected with these experiments, should have attempted, somewhat hastily perhaps, to construct a new theory of visible direction, adapted, *as he imagined*, to the phenomena he had observed, is doubtless to be regretted; still his facts remain, and the clearness with which they are stated, not less than the firm yet unobtrusive tenacity, exhibited by the author in contending for their value and significance, may claim, we think, more than our recognition. Dr. Wells has not only given to the world, a series of very astute and correct observations, respecting the phenomena connected with these experiments, but to him must be conceded

the additional merit, of having discerned in these phenomena, that which could not be reconciled with any previous theory of visible direction ; hence, ignoring the theory of identical points, he was led to the conclusion, that the visible direction of an object is determined by muscular action. "Assuming," he says, "as true, that the apparent direction of an object, which sends its picture to any given point of the retina, depends upon the state of action, existing at the same time in the muscles of the eyes, and consequently that it cannot be altered, excepting in a change in the state of that action, I shall proceed to trace to this principle."

To assert that the visible direction of an object, depends upon the state of action existing at the same time in the muscles of the eyes, so far as the statement is correct, is simply to announce a truism ; because, on the position of the eyes, with reference to the object viewed, depends the position of its image upon the retina, and on the position of the image upon the retina, depends the apparent position of the object in the external field. Having, however, adopted this hypothesis, Dr. Wells proceeds to enunciate his theory, a theory which, we think, is sufficiently met by our closing experiments, where it is shown that precisely the same apparent results, accrue if the visual and median lines be viewed with the optic axes parallel, as when viewed with the eyes converged ; we say the same apparent results, because, although the visible direction of the lines is the same, whether they be viewed under one or the other of these conditions, the attendant phenomena are not the same. Under both conditions, the visual lines are by both eyes referred to the median line, but with this important distinction between the two methods of observation ; viewed with the eyes converged, these lines are by each eye respectively, referred to the opposite side, so that the line truly seen by the right eye appears on the left side, and that truly seen by the left eye appears on the right side ; but when viewed with the optic axis *parallel*, there is no such apparent transposition of the visual lines ; thus viewed, the line of each side respectively belongs, so to speak, to the eye of the corresponding side ; and it is to be further remarked, that with this important modification with reference to the visual lines when viewed with the optic axes parallel, that no corresponding

change occurs with reference to the median line; this line, whether viewed with the optic axes converged or parallel, being under both conditions, referred by each eye respectively to the opposite side, so that the line truly seen by the right eye, appears opposite the pupil of the left, and the line truly seen by the left eye, appears opposite the pupil of the right.

If, then, as maintained by Dr. Wells, the direction of an object depends upon muscular action, how does it occur, that when the direction of the eyes is changed, and their relative positions altered, as must be the case under the circumstances we have been describing, that so far as relates to the median line, the visible direction remains precisely the same; and so far as relates to the visual lines, apparently the same, yet connected with the anomaly we have pointed out?

It will be observed that the fact to which we would here direct special attention, has reference to the visual lines, the apparent direction of these lines, whether viewed with the optic axes converged or parallel, being the same; that is, under both conditions, they are referred to the median line, but with this important distinction between the two methods of observation; when viewed with the optic axes converged, the line of the right eye appears on the left side, and that of the left eye appears on the right side; while, if viewed with the optic axes parallel, the line of each side belongs to the corresponding eye; in other words, is seen by the eye of the corresponding side, although under both conditions the visible direction of the lines is the same; this fact is noteworthy, and its solution will not, we think, be found in muscular action. But these are points suggestive of questions not at present under consideration.

While, therefore, we accord to Dr. Wells, as due to him, the priority in these two experiments, we may take the present opportunity for stating, that the facts connected with these experiments, were known to us several years previous to our acquaintance with, and quite irrespective of, the labours of Dr. Wells; and we refer to this circumstance with less reserve, from our having at the period to which we allude, prepared a paper relating to some of the phenomena of binocular vision, in which special reference was made to the points illustrated in the experiments of Dr. Wells; and although at the time

we were prevented from pursuing the subject, the paper to which we allude, with its accompanying illustrations, is still in our possession, and they show that our present statements, so far as they refer to these experiments, would, excepting in our allusion to Dr. Wells, have been precisely what they now are, had the 'Essay on Single Vision with Two Eyes' never appeared.

In the experiment immediately following those already alluded to, we view the two visual lines and the median line simultaneously; and, as in our first experiment, when viewing the visual lines alone, it was observed that these two lines were referred to the median line and appeared as one, and in the second experiment, when viewing the median line alone, it was observed that the apparent result was two lines, corresponding exactly with the true position and direction of the visual lines, we now remark, in viewing the three lines together, that the result obtained, is a combination of the two former results; that is, the median line appears as two lines, these two lines taking the places, so to speak, of the two visual lines, while the two visual lines are seen as one line, and this single line apparently takes the place of the median line. It is obvious that the phenomena connected with this experiment, occur simultaneously, and it should be also observed, that it is a condition essential to the due exhibition of these phenomena, that the width between the lines, should be exactly equal to the distance between the centres of the two pupils, of the individual observer, and that the eyes should be steadily converged upon an object in the direction of the median line.

We may now turn our attention to those experiments, where objects are viewed in the *direction* of the lines, to which such frequent reference has been made; and first we place two discs, one in the direction of each visual line, and seven inches distant from the corresponding eye, with eight beads upon the median line, leaving a space of one inch between each two of the beads, the first bead is to be on a plane horizontal to the two discs. (Fig. 4.) The objects being thus arranged, and viewed with the eyes converged upon a pin inserted on the median line, the result will be, a single image appearing in the direction of the median line, and presenting a combination of the two discs placed upon the visual lines; these discs, each respectively, being marked with a single diagonal line, the resultant image

being marked with a cross. The beads placed upon the median line, are by each eye referred to the opposite side ; the images of the right eye, are referred in the direction of the visual line of the left side, and the images of the left eye, are referred in the direction of the visual line of the right side. (See Result, Fig. 4.) These images are all seen with great distinctness, so that they can be counted, and excepting those nearest to the eyes, which appear on a plane horizontal to the visual image of the discs, they are seen to occupy a space beyond the visual image of the discs, that is, between it and the point where the optic axes meet, thus marking very clearly, the distance between the visual image of the discs, and the pin on which the eyes converge. This experiment precisely meets the rules laid down by Professor Wheatstone,¹ while the result obtained, is directly opposed to his theory, and opposed to it, on a point so fundamental, that to reconcile the two is impossible. The question then arises, is it our *results* that clash with the stereoscope? or may it not be, that while our results are perfectly consistent with those of the stereoscope, they are at variance with the *theory* that has been based upon the phenomena of the stereoscope? And the question we here raise, is one of some interest; for, doubtless, all the phenomena of vision must be consistent with the laws by which the function of vision is governed. Hence the solution of any single phenomenon of vision, to be conclusive, must not merely present an apparent completeness in itself, but it must also be consistent with all other phenomena of vision, and amongst them, of course, with those of the stereoscope. In the above experiment, we place two discs in the direction of the optic axes, at equal distances from the eyes, the resultant image is a combination of the two discs presented to the separate eyes, in short, it is a true binocular picture; we observe, however, that the visual image is not referred to the intersection of the optic axes, but that it is referred to the median line, and on a plane horizontal to the objects viewed.

In the remarks introductory to these observations, we expressed our belief that the experiments adduced in the present section, would be found to coincide with those that have pre-

¹ 'Transactions of the Royal Society of London,' 1838, "Contributions to the Physiology of Vision," Part I, page 373.

ceded them ; and we venture to think, that the experiment last noticed will form no exception to this rule, and that it not only coincides with all we have previously advanced, but further, that it connects itself, inseparably, with the phenomena of the stereoscope.

We may now briefly revert to the experiments and observations adduced in illustration of stereoscopic vision, and contained in our third section. Allusion was there made to the rules laid down by Professor Wheatstone, for the adjustment of the stereoscopic pictures, with special reference to the fact, that it is found to be essential to the stereoscopic effect, that one half of each picture should be placed within the visual lines, and that the other half of each picture should be placed to the outer side of the visual lines. It was further proved by experiment, that the superposition of the stereoscopic pictures, results from the cross direction of those portions of the two pictures, placed within the visual lines, and it was shown that these portions of the two pictures, when viewed in the stereoscope, are transposed, that opposite the right eye to the left side of the field, and that opposite the left eye to the right side of the field ; while those portions of the two pictures placed to the outer side of the visual lines, when viewed in the stereoscope, meet on the median line, and are seen, each respectively, by the eye of the corresponding side.

We were then treating of the stereoscope, and stereoscopic vision, and our statements were advanced as far as the facts then adduced appeared to justify ; we are now treating of some of the phenomena of vision, which could not be observed by means of the ordinary stereoscope, hence, having additional data before us, we are enabled to speak more fully, of the phenomena, then imperfectly illustrated, and are led to revert to our past experiments, not merely with a view to the more complete development of the facts they exhibit, but rather from a desire to render it apparent, that the entire series of results now before us, including those obtained from our previous, with those obtained from our present experiments, are all essentially connected. We may now compare the phenomena observed in viewing the lines, with those observed in viewing the two slides, introduced in illustration of stereoscopic vision, figured and described in our third section ;

on each of these slides is depicted a camel, or rather two distinct halves of a camel ; in short, they represent ordinary stereoscopic slides, one with the two inner halves of both pictures removed, the other with the two outer halves of both pictures removed ; in other words, so much of the two pictures as would be placed within the visual lines, is omitted in the former, and so much of the two pictures as would be placed to the outer sides of the visual lines is omitted in the latter. If the former of these slides be viewed in the stereoscope, the two sections of the picture meet on the median line, and the animal appears re-united ; while if the latter, in which those sections of both pictures remain, which are placed within the visual lines, be viewed in the stereoscope, each eye respectively refers its section to the opposite side of the field.

The close analogy between the phenomena connected with the lines, as compared with those observed by viewing the two slides above referred to, is very obvious. In our first slide, those portions of the two pictures placed within the visual lines being removed, leaves the remaining sections of the two pictures, each respectively *touching the visual line* of the corresponding side ; when viewed in the stereoscope, *these two sections of the pictures come together, or meet upon the median line*. By referring to our first experiment, it will be found that the visual lines, when viewed as we have described, *come together, or meet upon the median line*. In our second slide, those portions of both pictures, placed to the outer sides of the visual lines being removed, it leaves the remaining sections included within the visual lines ; these portions of the pictures when viewed in the stereoscope *appear transposed, each eye respectively referring its image to the opposite side of the field*, so that the portion of the picture really seen by the right eye appears opposite the pupil of the left eye, and the converse. It is seen in our second experiment, that if the median line be viewed in like manner, the *visual images appear transposed, each eye respectively, referring its image to the opposite side of the field* ; so that the line really seen by the right eye appears opposite the pupil of the left eye, and the converse.

We have alluded to the results obtained from the two slides above referred to, as being *analogous* to those obtained by viewing the visual and median lines, and the illustration we

have given may, we think, justify this statement; but we venture to add, space permitting, and these observations being carried to their legitimate conclusions, that the results obtained from the lines, and those obtained from the two slides, viewed in sections agreeing with the lines, would prove not merely *analogous, but absolutely identical*; and with the collective phenomena now before us, we desire to connect experiment 4, in which two discs are viewed in the direction of the optic axes, and where it is observed that the visual image is not referred to the point where the optic axes meet, but that it appears in the direction of the median line, and on a plane nearly horizontal to the two discs presented to the separate eyes.

The stereoscopic theory, is founded on the hypothesis, that the visual result will be the same, whether the eyes converge upon a single picture, or whether two similar pictures be viewed in the direction of the optic axes. Professor Wheatstone starts from this point, assuming that images placed in the direction of the optic axes are referred by the mind to the point where the optic axes meet; but we prove by experiment, that images so placed are referred to the median line, and appear on a horizontal plane nearly even with the reality.

When we desire to examine an object, by an inherent property of our nature, we converge the eyes upon a point of that object; under these circumstances, the axes of the two retinæ, connect themselves functionally, with the *single point* on which they are converged; but in stereoscopic vision, the axes of the retinæ are made to receive their respective images, *from two distinct points*; the arrangement of the stereoscope being such as to secure, that the axis of each retina respectively, shall receive its image from the *centre* of the corresponding picture, the distance between the centres of the two stereoscopic pictures, being equal to the space between the visual lines; if, therefore, it can be shown by experiment, *that the axis of each retina refers its image to the median line, while all collateral images, retain their true relation to their respective centres, that is, to the centre of the retina to which they respectively belong*, it follows that in stereoscopic vision, the inner half of the picture of each retina, must pass over to the opposite side of the field; and that this incongruity is not

apparent in stereoscopic observations results from the pictures of the stereoscope, being adapted *to the artificial requirements of the instrument*; and it is due to this artificial arrangement, that the pictures viewed in the stereoscope appear as one, for were the two pictures dissimilar, if placed in the same relation to the eyes, superposition would occur, and confusion must result.

For experiment 5 we place three beads upon the median line, distant nine, ten, and eleven inches from the eyes; and three discs, in the direction of each visual line, on a plane horizontal to the beads; the beads are not raised, but lie upon the bottom of the stereoscope, so that when viewed, the discs are rather above, and the beads a little below the axis of vision. The objects being thus placed, the eye-plates adjusted, and the eyes directed, as in the previous experiments, there will appear three rows of discs, with two rows of beads, making in all five groups of images, and to the apparent position of these several groups, we may now direct our attention. It is proposed, first to observe the position and grouping of these images generally, we may then compare the apparent position of the images in the external field, with the parts of the retinae on which they respectively fall; and thus we shall be led to inquire, *under what circumstances these several groups of images, are brought into their apparent relation to each other.*

There is, we observe, a central group of discs consisting of three images, *each image respectively being marked with a cross*, on either side of the central images, and nearly agreeing in direction with the optic axes, may also be observed a row of three images of discs, each image being marked with a *single diagonal line*; and to complete the groups, there still remain two other rows of images—we allude to those of the beads; these images are referred by each eye respectively, in a direction exactly agreeing with the visual line of the opposite side. The three central images are binocular; they result from a combination of the discs placed in the direction of the optic axes, and the combination is evident, from their being marked with a cross, while the discs presented to the separate eyes are marked each respectively with a single diagonal line. (See Fig. 5, and result.) The two other rows of discs, referred

laterally, are monocular images, and that they are so is evident from their being marked, each respectively, with a single diagonal line. Of the several groups, the central images alone present a true binocular effect, they fall near to the axes of the eyes, and by both eyes are referred to the median line. If now it be inquired, why have we three rows of images of the discs, the central and two lateral? it may be observed that objects placed in the direction of the visual lines, fall not only upon the axis of the corresponding retina, but that they also fall upon the temporal side of the opposite retina,—the central images of the discs result from the former, the lateral images from the latter; they correspond to the side pictures in the ordinary stereoscope, and result from the picture of either side, being seen by the eye of the opposite side, as in the stereoscope if the septum be omitted. The beads placed upon the median line, likewise fall upon the temporal sides of the retinæ, and are by each eye respectively in like manner referred to the opposite side of the field; hence, if either eye be closed, the lateral images, both of the discs and also of the beads, are lost on the opposite side.

Having thus glanced at the general grouping of the visual images in this experiment, we may now compare the apparent position of the images in the external field, with the parts of the retinæ on which they respectively fall. There are, we have said, three discs placed upon each visual line; it would be more exact to state, that the wires that support the discs are inserted in the direction of the visual lines, so that one half of the disc is within, and the other half on the outer side of the corresponding visual line; it follows, therefore, that so much of each disc as is to the outer side of the visual line, falls on the nasal side of the corresponding retina, and that so much of each disc as is placed within the visual line, falls on the temporal side of the corresponding retina, an arrangement which, it should be observed, places the disc under conditions exactly similar, to the pictures viewed in the ordinary stereoscope; hence these images of the discs, like the stereoscopic pictures, are superposed and appear as one; and further, as it regards these central binocular images, we must not fail to note, that *if one eye be closed*, there are still present *three central images* of discs, the only perceptible change in the

visual result, occasioned by closing one eye, so far as relates to these images, being that they are no longer marked with a cross, but that each image respectively, is marked with a single diagonal line ; in short, they are single images seen by a single eye ; still *they are referred to the median line.*

If now we observe the apparent relation of the visual images of the beads, placed upon the median line, with reference to that of the discs placed upon the visual lines, we remark that they appear nearly in the same direction. Still it will be evident, by referring to result, Fig. 5, that the latter are spread out, so to speak, appear more lateral than their true position, and most so in proportion as they are nearer to the eyes. This is very observable, when we compare the apparent position of the visual images with the true position of the objects viewed. Both these groups we have already stated, fall upon the temporal sides of the retinae, but those of the beads fall somewhat nearer to the centres, those of the discs to the periphery ; hence the spreading of the latter. And in the visible direction of the discs, we have an illustration of the fact, *that the position of the image upon the retina, determines the apparent position of the object in the external field.*

It will be observed, that in the experiment we are now considering, the eyes are directed immediately forwards and converged upon a single point, the discs being so placed that their images simultaneously fall, upon two distinct parts of the retinae, they are referred to the central part of the corresponding retina, and to the temporal side of the opposite retina ; in the former case, their apparent position is inwards in the direction of the median line, in the latter outwards and nearly in the direction of the visual line of the opposite side. We note, that in neither case does the apparent position of the visual image, agree with the true position of the object viewed ; yet under both conditions, the apparent position of the objects viewed, perfectly agrees with the position of their images upon the retinae ; that is, they appear in the direction of a line, vertical to the part of the retina to which they are respectively referred.

We have in the experiment under notice, three distinct stereoscopic pictures of the discs, two lateral rows of monocular images of the discs, and two rows of beads, making in all five

distinct groups of images, and all these images can be distinctly seen while the eyes are kept fixed upon the point of convergence. It would be difficult to judge of the distance between the central images, as it must be when objects are placed immediately before the eyes, and one in advance of the other; but under the arrangement of this experiment, the several distances are clearly defined by the lateral images, which appear on a plane even with those of the centre.

We must, however, guard ourselves against being understood to imply, that these images are all seen at the same time with equal clearness; to assert this, would be to make a statement contrary to the known laws of vision; the idea we desire to convey is, that these several images can all be seen at the same time, and perfectly recognised, while the eyes are kept fixed upon the point of convergence; and we may illustrate our meaning, by supposing the hand to be held twelve inches before the eyes, with the eyes converged upon the middle finger; under these circumstances the middle finger will be seen, with more distinctness than any other part of the hand, but still the thumb, and the little finger, will be obviously present.

What we have hitherto advanced with reference to the experiment under notice, relates almost exclusively to the visible direction of the objects viewed, considered in relation to the parts of the retinae affected; and we remark, that the apparent positions of the visual images, although perfectly agreeing with their positions upon the retinae, is in every instance at variance with the true position of the objects viewed; and this, while the eyes are in a natural position, and steadily converged upon one point.

We may now, therefore, inquire how these several images are brought into their apparent relation to each other. We place three objects upon the median line, distant nine, ten, and eleven inches from the eyes, with three other objects in the direction of each visual line, the latter being placed on a plane horizontal to the former. In viewing these objects with the eyes converged upon a more distant point, we perceive an apparently complicated arrangement of visual images, comprising five distinct groups; and we remark, that each group respectively, as well as each image in particular, is referred to its place in the external field, with a precision that could not

be exceeded ; *still, notwithstanding this precision, every image when considered with reference to the real position of the object viewed, appears to be out of place ;* and so truly, thus regarded, they are all out of place. The question then arises, under what circumstances are these several objects, brought into their apparent relation each to the others ? and guided by the phenomena we have been previously considering, a little reflection will, we think, enable us to decipher, the *apparent* complications exhibited in the arrangement and grouping of these images, nor shall we fail to perceive, that the result before us is in perfect harmony with all we have been previously observing, and that the apparent complication of these images arises from one single and very simple action.

The visible direction of the objects placed upon the visual lines, is identical with the visible direction of those lines, as exhibited in our first experiment ; namely, these objects are referred to the median line, and the visible direction of the objects placed upon the median line, is identical with the visible direction of that line as exhibited in our second experiment ; namely, these objects are referred, by each eye respectively, in a direction agreeing with the visual line of the opposite side ; so that in viewing these small distinct objects, placed in the direction of the lines, we recognise the same law of visible direction, as in viewing the lines ; and if we regard the images of *each eye singly*, it will be apparent that they are all referred in a direction agreeing with their respective positions upon the retinae. *Still the visible direction of individual parts of the retinae, will not explain the apparent position of these images, and we perceive in the result before us, more than this,—* we observe, not only that every image upon the retina, is projected in the direction of a line perpendicular to itself, but in the grouping of these images, we perceive another and a distinct action, *affecting the entire field of each retina respectively ;* for not only does each point of the retina refer its image in a direction vertical to itself, but the entire field of each retina respectively, is referred inwards, *so that the centre of each picture, that is, the picture of each retina, is referred to the median line, while the collateral images of both pictures, retain their true relation to their respective centres, or to the centre of the retina to which they respectively belong.* Nor is

the perfect uniformity of visual direction, exhibited in these small separate images, to be disregarded, for perhaps the most certain, if not the only, method for detecting fallacy, with reference to questions relating to visual direction, consists in operating upon small distinct portions of the retinae; certainly it has been by adopting this method, that our own course has been directed. And who, we might venture to inquire, by viewing the two pictures as prepared for the stereoscope, would be led to suspect the confusion that results, if spaces corresponding to the stereoscopic pictures, be covered with small distinct pictures, and viewed in like manner in the stereoscope? (See Fig. 2, Section II.) And yet these small distinct images indicate, with unfailing precision, the visible direction of every part of the entire picture.

The arrangement for the next experiment includes a pair of stereoscopic pictures, with several other distinct objects, placed some upon the visual, and others upon the median lines, thus including in one result, the superposition of the stereoscopic pictures with the reverse action of different tracts of the retinae. The stereoscopic pictures are placed in a central position, that is, about midway between the eyes and the point on which they converge, and beyond the stereoscopic slide, between it and the point of convergence, are five objects, placed at equal distances upon the median line; there are also two objects placed upon the visual lines, nearer to the eyes than the stereoscopic pictures (fig. 6). If these objects be viewed in the adjustive stereoscope, the resultant images can all be seen at the same time, and without confusion; those placed upon the visual lines, and nearest to the eyes, are referred to the median line; the stereoscopic pictures are perfectly superposed, and *appear at their true distance from the eyes*; the objects placed upon the median line, and more distant from the eyes than the stereoscopic pictures, fall on the temporal side of the opposite retina, and are referred by each eye respectively to the opposite side of the field; these images appear in two rows, and can be clearly seen to occupy a space, more distant than the stereoscopic pictures, between them and the point on which the eyes converge (result, fig. 6). And had we no other evidence before us, this single experiment would, we think, prove that the visual images resulting from the stereoscopic pictures, as

viewed in the ordinary stereoscope, are referred, not to the point where the optic axes meet, but that they are superposed on a horizontal plane, corresponding with the distance of the pictures from the eyes. This experiment is important to our series, not that it exhibits anything additional, for in truth all that it shows is contained in the other experiments, *but its value consists in forming a perfect link, between the phenomena of the stereoscope and those of the lines.* We have already shown the close analogy, or rather *the complete identity*, of the results obtained by viewing the lines, with those obtained by viewing the stereoscopic pictures, in sections agreeing with the lines; and we have connected these phenomena with the additional fact, that an object viewed in the direction of the optic axes is referred to the median line. Under the arrangement of the above experiment we obtain, by means of the objects placed in the direction of the lines, a complete illustration of the phenomena observed in viewing the lines, and this in combination, with the superposition of the stereoscopic pictures; thus do we include in one simultaneous action, the phenomena of the lines with the great and dominant fact of stereoscopic vision; nor is it merely that these phenomena are included in one result, but, viewed in connection with the observations contained in Section III, the experiment before us amounts to a demonstration, that the superposition of the stereoscopic pictures, not only perfectly agrees with, but that it is simply a fuller development of, the same phenomena, and results from the same laws, which determine the visible direction of the lines.

Can we, then, accept the stereoscope as an exponent of ordinary vision, while we reject the phenomena of the lines as "anomalous and individual"?

Our closing experiment, has reference to monocular vision, and is intended to exhibit, in one distinct result, a phenomenon which has been constantly recurring through all our previous observations. We present a picture to one eye alone, the other eye being closed; the picture is to be mounted and fixed as explained in the descriptive part of the experiment; a pin, or ivory peg, is to be inserted on the median line, distant eighteen inches from the eyes, and it is required that the eye-plates should be first adjusted for the two eyes, *care being*

taken, that when the eyes converge upon the pin, the visual lines form equal angles with the visual base ; these conditions being secured, one eye is to be closed, or it will be preferable to close the visual aperture for one eye. If, under this arrangement, the single eye be directed to the pin upon the median line, the picture placed in the direction of the optic axes will appear immediately in front of the observer, the centre of the picture over the median line.

We would associate with this fact the phenomena connected with our previous experiments, so far as they relate to the point under notice. In viewing the visual lines it was observed, not only that the two lines, when viewed with both eyes simultaneously, were referred to the median line, but we also remarked, that on one eye being closed, and the single visual line viewed with the other eye alone, that still the single visual line was referred to the median line. Again, in the experiment with the discs, when viewed with both eyes, the apparent result was three stereoscopic images of the discs, in the direction of the median line ; but on one eye being closed, we still observed three images of the discs referred to the median line ; they were single images, but our remark was that these images, the result of a single vision, were referred to the median line. And again, in those experiments, with the optic axes parallel, the same phenomenon presented itself—the single eye referred its image to the median line. In the present experiment a single picture is presented to the single eye, the centre of the picture being placed opposite the axis of the eye, and the resultant image is referred to the median line.

This experiment evidently connects itself, with our observations on the visible direction of the images. In Experiment 5 our remarks then, as now, had reference to the projection of the two retinal pictures, to the same place in the external field, the axis of each retina referring its image to the median line, while the collateral images retain their true relation to their respective centres—that is, each image respectively to the centre of the retina to which it belongs. And, further, that whether the eyes be acting separately or in concert, their direction is the same.

Description of Plates Illustrating Mr. Towne's Observations.

In the figures the objects are all represented, as though they were placed upon the floor of the stereoscope. It will be understood, that when viewed, the discs, and also the stereoscopic pictures, are placed vertical to the eyes.

PLATE I.

The first six figures relate to the visible direction of the visual and median lines; the remaining six figures relate to the visible direction of objects viewed in the direction of the lines. In all these experiments, the eyes are converged upon a pin, inserted upon the median line, distant from the eyes eighteen inches.

Fig. 1.—Represents the visual lines; the line of the right eye is red, the line of the left eye is black. The apparent result is a single line in the direction of the median line; the lines are represented in the figure just before they unite, or as they appear if the eyes be converged upon a point somewhat nearer than the true distance; the line of the right eye is seen on the left side, and the converse.

Fig. 2.—The median line, viewed with the eyes converged as described, the direction of vision is indicated by the dotted lines. The apparent result is two lines exactly in the direction of the visual lines; the line of the right eye being referred to the left side, and the converse.

Fig. 3.—The visual and median lines viewed simultaneously, the former being black, the latter red. The visual lines are referred in the direction of the median line, and appear as one; the line of each eye respectively approaching the centre from the opposite side. The median line is referred, by each eye respectively, exactly in the direction of the visual line of the opposite side.

Fig. 4.—One disc is placed in the direction of each visual line, and eight beads upon the median line. The discs are referred to the median line, and appear as one. The beads are referred, by each eye respectively, in the direction of the visual line of the opposite side.

Fig. 5.—Three discs are placed in the direction of the visual line for each eye, and three beads in the direction of the median line. The apparent result is five groups of images; one central group, comprising three binocular images of the discs; the remaining images are all single, and are by each eye respectively referred to the opposite side, the beads in the direction of the visual lines, and the single images of the discs nearly in the same direction, but more lateral.

Fig. 6.—A disc is placed in the direction of each visual line, distant seven inches from the eyes; beyond the discs are two stereoscopic pictures, and more distant from the eyes, that is, between the stereoscopic pictures and the point of convergence, are five beads in the direction of the median line. The two discs, placed in the direction of the visual lines are referred to the median line. The five beads placed upon the median line are by each eye referred in the direction of the visual line of the opposite side. The stereoscopic pictures are superposed and appear as one.

PLATE II.

Fig. 7.—A picture viewed with the right eye alone, the centre of the picture being placed in the axis of vision; the picture is referred inwards, its centre appearing over the median line.

Fig. 8.—Represents a board six feet in length, a stereoscopic slide is placed at the distant end of the board, and viewed with the optic axes *parallel*. The apparent result is three pictures; the central image is binocular, the two lateral images are single; that of the right side is seen with the left eye, and the converse.

Fig. 9.—A septum is introduced, so that the image of the right side falls on the right eye alone, and that of the left side on the left eye alone. The apparent result is a single image, a combination of the pictures presented to the separate eyes.

Fig. 10.—The septum being removed, a picture is presented to the right eye, *the optic axes being parallel*. The apparent result is two pictures, one central and one lateral; the central image is lost if the right eye be closed; the lateral image is lost if the left eye be closed.

ON

CYSTIC OR HYDATINIFORM DISEASE
OF THE CHORION.

By J. BRAXTON HICKS, M.D., F.R.S., &c.

INASMUCH as the true nature of the cyst-like distension of the chorion-villi is still a subject of dispute, perhaps it may be useful to bring forward the results of the examinations I have made of those specimens which have come before me in a recent state, and to add such remarks as seem naturally to arise out of the subject.

Those who have paid attention to the disease will remember that it is still held by some pathologists¹ to be an excellent example of the class called "proliferous cysts;" in other words, that the secondary cysts are derived by sprouting from the primary cysts, although the latter are originally changed villi; that cysts spring as true cysts from one another in virtue of the impetus derived from the original change. Again, they will remember that opposed to this view there are some² who look upon it, not as cyst from cyst, but such a change of pre-formed tissue, that the younger branches, already growing at the time of the invasion of the disease, subsequently change in the same manner as the other parts.

I have already, in the last number of these 'Reports,' in examining the validity of the title "proliferous cysts,"³ ex-

¹ Paget, 'Surgical Pathology,' 2nd edition, 1863. Mettenheimer.

² Gierse, Dr. Graily Hewitt, &c.

³ "On the Glandular Nature of the Proliferous Cysts of the Ovary, with Remarks on the Nature of Proliferous Cysts;" 'Guy's Hospital Reports,' 1864, p. 238.

pressed my belief that no such class remains, when we have taken from it adenoma of the breast, proliferous disease of the ovary, and the disease now under consideration; and I also expressed the coincidence of my opinion with that of those who regarded the so-called cysts of the chorion not as growth of cysts from cysts, but merely a subsequent change in parts already formed or forming at the time the change commenced in the large cysts to which they were attached.

It will not be necessary to give the separate details of the four specimens which were examined, because each one entirely resembled the other.

Whatever may be exactly the tissue involved in the change, whether the cells from which are formed the blood-vessels or those supposed to perform the glandular office, the *first difference* which is apparent, coincident with the enlargement of a portion of the villus, is the filling of it throughout by either complete cells, or by some in an incomplete state. These entirely fill up the interior, thereby rendering the appearance of the dilated part opaque (Pl. I, fig. 1). The form and size of these cells are variable, some being four or five times larger than the others, of a globular or oval shape, the walls sometimes of very considerable tenuity, with or without nuclei. Some (fig. 1, *a*) are branching connective-tissue nuclei (unformed or germinal matter of Beale), either distributed in a linear manner or irregularly disposed, in variable states of formation, connected together frequently (especially at a later period) in a stellate manner (Pl. I, fig. 1, *b*, *b*, fig. 2, *a*). One can scarcely doubt but that it is the growth of these elements which distends the villus at the commencement of the change, and, indeed, to a considerable period. However, after a time, a clear fluid infiltrates between the cells, &c., causing their separation one from another (particularly the more delicate kinds), while about the same time many of the cells undergo dissolution, probably by the ordinary processes. But also the germinal matter more completely matures itself into connective tissue, most commonly of the stellate variety (fig. 2, *a*, fig. 3), which is to be found in the later stages of the disease in considerable quantity, not in the incomplete state found at first.

Thus at the later stages we have the interior filled with

clear fluid, the stellate variety of connective tissue widely separated by the distension, so as to form a network throughout the interior. Thus it is, that when in the latter stages we prick the distended villi a nearly complete collapse ensues, nothing remaining within but the above-described stellate elements, while in the earlier stages the collapse is relatively incomplete.

It seems, therefore, from a consideration of the above, that, the proper function of the villus having ceased, the material within, instead of going on to the development of the proper tissue, produced only a low or more simple form of tissue, requiring little power for its differentiation.

It happens occasionally, but by no means very frequently, that the centres of this connective tissue undergo fatty degeneration, as shown at fig. 4. In such instances, of course, ultimately all the consecutive tissue disappears, nothing but clear fluid remaining.

With regard to the walls of the cyst, I found it to be composed of two layers, both having for its basis a transparent delicate membrane (fig. 2, *b*, *c*). In the external one (*b*) were to be seen nuclear masses, which at first were far apart (fig. 2, *d*), but afterwards closely approximated, and had small granules (fat ?) within these, thereby rendering the cyst opaque.

The internal layer (*c*) possessed fewer nuclear masses, generally of an oval or elongated form.

The nature of the small club-shaped projections on the surface of a large cyst (fig. 1, *c*, *c*) can be seen, by comparison with the normal villus, to be the same in the mode of formation, nor does there seem to be any growth of them from the villus subsequently to its cystic change.

The appearance of cyst after cyst upon the same string-like cord, perhaps, has tended to favour the idea that the cysts have grown successively in point of time from one another; but a moderately careful examination will show that, not only the clavate extremities of the villi are changed, but frequent portions of the stems also. The simultaneous growth, or expansion of all these myriads of parts, sufficiently account for the magnitude of the mass, and the rapidity of its increase, without requiring the aid of additional growths.

The description given above of the changes within the villus is much in accordance with the appearances described by Dr. Priestley, in his 'Lectures on Development of the Uterus,' &c., excepting that the nucleated delicate cells were in my cases more rare, while in mine the connective tissues was more extended. Dr. Graily Hewitt also describes a case¹ where the appearances were much the same.

That the first distension arises from a growth of cells or nuclei within the villus, but in an abnormal direction, with less differentiation than proper, seems clearly to be the general mode; that the form these cells or germinal masses may assume seems somewhat variable; they are most of them, particularly the globular nucleated forms, probably short-lived, undergoing solution by the ordinary processes, leaving a clear fluid within the distended villus, while those which form the connective-tissue element are more durable, remaining generally throughout the life of the cystoid distension.

Up to this point most modern observers are agreed; but the point of difference yet remaining is in respect to the origin of the smaller pendulous growths. Of course upon this hinges the question whether this form is truly an instance of growth of cyst from cyst, and thereby of proliferous cystic disease; or whether, as already alluded to, merely a subsequent change of parts already formed.

I have already stated my reasons for doubting that cysts arise subsequently as cysts from prior cysts. But even allowing that the secondary growths could arise as cysts from a parent cyst, it seems to me that this disease can scarcely be an instance of the class. The change would merely be a continuation of the growth after the normal type at first; and not equivalent to the disease of a part where there is no tendency to branch, but which disease produces a succession of cysts from one another. In other words, the growth would be owing to the natural impulse, not to one superadded to it, as must be supposed by the term "proliferous cyst."

But a consideration of the rare case described at page 185 will assist us much in this question, because it will be there shown that the cystic change is not a necessary condition, but that the disease may progress only up to the enlargement pro-

¹ 'Obstetrical Transactions,' vol. i.

duced by the growth of the cells, &c., within, and not proceed to the infiltration of fluid. Thus, it seems to me that this disease cannot be classed as an instance of proliferous cyst. It is not here intended to enter into the other questions, whether it occurs prior or subsequent to the death of foetus, &c. The infrequency of our finding the foetus tends to point out the early age at which it probably occurs.

The following specimen serves to explain the origin of hydatiniform disease of the chorion. It was taken from a woman who was seized with labour-pains after having been amenorrhœal for the full period of pregnancy. After some hours she expelled from the uterus a firm mass, about the size of two fists. There had been no flooding whatever before, and the patient had thought herself to be normally pregnant.

The solid mass was composed principally of the ovular membranes and villi, with some deciduous portion, a small amnial sac, but no trace of the foetus. The villous portion, on section (Pl. II, fig. 1), was found to contain *cystic* distension of the villi (fig. 1, *a*), dispersed rather sparingly through the mass. The *principal* portion was composed of villi dilated (fig. 1, *c*), in various parts. The dilatations were not nearly so large as in cystic variety, but still well marked; they were quite *solid*, and very firm. Viewed under a microscope they were found to be solid throughout, and the contents to be closely packed masses (germinal, Beale) (fig. 2), like those found in the early stages of cystic disease. These masses had not proceeded to form true cells, but were tolerably distinct, though mutually but firmly pressing each other.

The occurrence of some of the villi in this form of distension, and of others in which the disease had advanced to the distension by fluid, seems to go far to show, independently of other evidence, that the cystic distension cannot be ranked as a distinct growth of cyst from cyst, so as to be embraced under the idea conveyed by the term "proliferous cyst," that is, of cyst developed as the progeny of another cyst. Careful investigation may reveal other transitional states, tending also still further to elucidate this point.

DESCRIPTION OF PLATES

*Illustrating Dr. Braxton Hicks' Paper on Cystic or Hydatini-
form Disease of the Chorion.*

PLATE I.

Fig. 1. Early condition of the dilatation of the villus.

- a.* Very delicate cells.
- b.* Connective-tissue elements.
- c.* Small branches as yet unchanged.

Fig. 2. More advanced stages of villus.

- a.* Stellate connective tissue within.
- b.* Outer layer of wall.
- c.* Inner layer of wall.
- d.* Early stage of *b*.

Fig. 3. Enlarged view of tissue within the villus.

Fig. 4. Fatty dissolution of connective tissue in a villus.

Fig. 5. Cysts *in situ*.

- a, a.* Cysts.
- b.* Blood-vessel.
- c.* Decidual cells.
- d.* Same enlarged.

PLATE II.

Fig. 1. Section of the placentoid mass.

- a.* Cysts of the villi (hydatiniform degeneration).
- b.* Cavities from which some of the cysts have been removed.
- c.* Distension of villi by solid cell-formation within.

Fig. 2. Enlarged appearance of the solid distension of the villi.



Plate 2

1. Position, as to what organ the tumour corresponds to, supposing the frame were in a healthy condition.

2. The number and size of the growths.

3. The surface, whether smooth, rough, nodular, and whether the growth is diffused or circumscribed.

4. The consistency, whether solid, fluid, or gaseous.

5. The mobility, whether fixed, mobile, or pulsatile.

6. The sensibility, whether pain is experienced with or without tactile manipulation.

7. Functional integrity.

But it is not sufficient to determine the part that is affected ; we must try and ascertain the character of the growth :— 1, whether the tumour arises from inflammatory deposit of serum, lymph, pus, or fibroid tissue ; 2, whether it is cystiform, and as to its contents whether serous, hydatid, sanguineous ; 3rd, whether of a strumous or cancerous nature.

To enter minutely into these several divisions would be quite beyond the limit of the present communication, and the cases themselves will best serve to illustrate the subject. I will only mention that those changes in position which are the result of diseased action must be carefully noted in deciding upon the organ affected. The pylorus may be pushed low down from its normal position, the cæcum may be twisted over even into the left hypochondrium, and the sigmoid flexure may be equally displaced to the right side ; and so also with almost each viscus in the abdominal cavity, for the position of healthy organs is greatly modified by morbid affusions.

CASE 1.—*Disease of appendix cæci ; suppuration in the centre of the ilium and in the course of the psoas and iliacus muscles ; opening below Poupart's ligament ; extension to the diaphragm ; acute empyema.*—Solon R—, æt. 65, admitted under my care October 19th, 1863, was a tall man, of aged appearance, who had been ill about three weeks. At first severe pain came on across the lower part of the abdomen, but especially in the region of the cæcum ; purgatives had been given, and vomiting quickly followed. On October 22nd the abdomen was found to be supple, and free from general tenderness, except in the region of the cæcum ; at that part, and at the commencement of the ascending colon, there was a hard,

well-defined mass, extending nearly to the median line, and there was much tenderness on pressure; but pressure in the right loin produced no effect, and on turning over upon the left side the mass remained fixed. No blood had been passed. The pain was increased by food; the tongue was clean, the pulse compressible. There was no febrile excitement.

Quinæ Disulph., gr. j;
Pulveris Doveri, gr. iij. Ter die sum.

On the 24th he complained of cough, and there was no relief to the general symptoms.

Liquoris Morphine Acetatis, ℥v,
ex Mist. Camph., ℥j. Ter die sum.

Empl. Lyttæ applic. parti dolenti.

29th.—He was in less pain, and the tumour was smaller.

November 14th.—There was pain on the anterior part of the thigh, and redness below Poupart's ligament. The pain in the groin became very severe; the pulse was compressible, and the patient seemed exhausted from the continuance of the pain. The bowels were moved by aperient medicine or injection, but the constipation was increased by the opiate medicines which were given to relieve the pain.

At the beginning of December an opening formed in the groin, and abundant discharge of pus took place; it was not fecal in smell; the severe pain then subsided, the pulse improved, and he seemed in every respect more comfortable. The hardness, however, in the region of the cæcum still continued. Stimulants were given freely.

January 7th.—There was still discharge from a small fistulous opening in the groin; the hardness in the abdomen did not extend so high above Poupart's ligament, and was free from tenderness. The tongue was clean, the pulse had improved in power, and the bowels were open, but the appetite was poor.

21st.—During the last fortnight the report was that he had had several attacks of severe pain in the lower part of the abdomen on the right side; these attacks seemed to be connected with attempting to stand or to get out of bed, and the pain extended upwards. Vomiting took place, apparently

from gastric disturbance arising from having partaken of some porter, &c. The pulse was compressible, the bowels open.

28th.—The abscess below Poupart's ligament had almost closed, and there was an increase of pain; another small abscess formed, and, having been opened, the pain again lessened. The symptoms remained very much the same till the middle of February, when pain extended upwards, and soon became of an agonising character, so that he could scarcely take a breath. On examining the base of the right lung there was dulness and absence of respiratory murmur, with increased resonance of voice; purulent expectoration took place, and it was evident that acute pleuro-pneumonia had been set up at the base of the right lung, and this the inspection confirmed.

The severe pain continued, and the prostration increased. He sank on April 3rd, for several days having become extremely prostrate, and unable to take food.

On *inspection*.—*Chest*.—Partial adhesions had taken place in the left pleura, but in the right were two or three pints of pus of a very offensive character. The lung was compressed. The pericardium was healthy.

Abdomen.—The general peritoneum was healthy; the intestines were empty, the cæcum also was contracted; a portion of omentum was adherent to the internal abdominal ring, and on gently making traction at this part pus exuded, but there was no peritonitis. Behind the cæcum the psoas and iliacus were degenerated, and infiltrated with pus; a large abscess extended downward below Poupart's ligament, and upwards in the course of the muscle; a small part of the iliac bone was bare. On the convex surface of the liver, between it and the diaphragm, was a patch of purulent lymph, but quite circumscribed. The liver itself was pale and fatty. The kidneys were healthy, so also the spleen. The posterior part of the cæcum presented thickened dense tissue, and the appendix was imbedded in this dense tissue; its coats were also considerably thickened.

Acute disease of the cæcum is of common occurrence, especially in the early and middle periods of life; it is generally easily recognised, and, when properly treated, tends to speedy recovery, but it is rare at sixty-five years of age. The simplest form of

cæcal disease is distension with muco-enteritis ; the bowels are confined ; sometimes diarrhœa ushers in the complaint, severe local pain with febrile excitement is induced, and the patient becomes alarmingly ill. If the symptom of constipation be treated instead of the patient's malady, purgatives are given and vomiting is the result ; the pain is increased, local peritonitis is induced, and sometimes severe and even fatal inflammation come on. This disease yields best to rest, to hot fomentations, and to small, often-repeated doses of opium, with salines. A very severe form of this disease is accompanied by the deposition of a diphtheritic membrane upon the mucous coat. If the patient be of a strumous and delicate constitution the disease is more likely to be protracted, and to be followed by severe local peritonitis, by the deposition of low organized fibrin, and by strumous disease of the peritoneum. The treatment just mentioned is then doubly important, and should be followed by cod-liver oil and by a generous diet, as soon as they can be borne. In these instances I believe that calomel and grey powder should be especially avoided, as likely to lead to ulceration, and to increase the tendency to strumous deposition.

If the enteric inflammation of the cæcum be followed by ulceration of the mucous membrane, we find in addition to the febrile symptoms an alternation of diarrhœa and constipation ; and the disease is generally associated with loss of power and with cachexia, and is often the accompaniment of strumous disease of the lungs. It is when this form of ulceration extends through the muscular coat that severe local or general peritonitis is set up ; still, if adhesions have formed, extravasation is prevented, and thus localized, life may be prolonged. Even if no perforation have actually occurred the effused lymph may break down, so as to form abscess ; and the duration and localization of the collection of pus modify the character of the symptoms, whether in front and bounded by adherent coils of intestine, or posteriorly in the cellular tissue.

Another form of ulceration of the cæcum is observed in obstruction of the colon and rectum, and this state we have repeatedly seen in chronic contraction at the sigmoid flexure. The cæcum, in common with the part of the colon above the obstruction, becomes distended, and stretched, till at length the mucous membrane gives way just as the skin of the leg yields

in great dropsical distension. This peculiar form of ulceration is shown by small transverse ulcerations, the deeper tissues as far as the peritoneum become involved, and at length perforation or acute peritonitis hastens the fatal issue.

In ulceration of typhoid fever, especially in strumous subjects, secondary disease of the cæcum and peritoneum are sometimes induced, and health is only restored after lingering illness.

Several times in acute English dysentery we have found the cæcum most extensively involved, its mucous membrane sloughing, and the cellular tissue infiltrated with purulent deposit; and in other cases of severe cæcitis the mucous membrane often presents an adherent covering of diphtheritic membrane.

The appendix cæci is affected in these several methods, but, being removed from the general canal, changes often exist without producing any symptom, till extension has taken place to adjoining structures. Thus, the appendix is often found to be distended with a mucous secretion in strumous subjects; often it is filled with fæces, either generally or in concrete masses resembling foreign bodies; and with equal frequency we find ulceration without any symptom, and these ulcers sometimes surround the appendix, but usually they are small and oval in form. It is this form of ulcer that is of great interest, because it extends through the muscular coat insidiously into the peritoneal sac. The patient may have been unconscious of pain till a sudden intense suffering in the part reveals serious disease. In the case we have recorded the disease extended, not into the serous membrane, but into the cellular tissue of the venter of the ilium, and the secondary changes thence accruing were the cause of the subsequent symptoms and of the fatal issue.

The cæcal disease, in S. R—, originated in the appendix, and set up inflammation in the adjoining cellular tissue; suppuration and abscess followed, and the pus extended downwards till an opening was formed below Poupart's ligament. The severe symptoms then subsided, but strength did not return, and pain was experienced towards the right loin. This also diminished, but suddenly intense suffering came on in the right hypochondrium, and at the base of the right lung respiration was affected, and it was evident that acute disease had resulted above the diaphragm, and that pleuro-pneumonia had been

produced. The abscess had extended to the diaphragm, then above it, and it had induced empyema. Such was the general course of the disease, and the only prospect of cure was in the gradual diminution of the size of the abscess, instead of its untoward extension and advancement.

When the patient was admitted into Guy's Hospital, there were some difficulties in the diagnosis. The disease was evidently in the neighbourhood of the cæcum, and *three* things suggested themselves:—1. External suppuration, either in front of the cæcum, or behind it and extending forwards. 2. Cancerous disease of the cæcum. 3. Primary inflammation of the cæcum, followed by ulceration. Afterwards disease of the spine and psoas abscess, or suppuration external to the kidney were discussed.

1. Suppuration in the abdominal walls is often mistaken for abscess connected with the viscera themselves, and at an early stage, on account of the mischief being situated beneath the fascia, the diagnosis is very difficult; still more obscure are the physical signs when the suppuration is in the posterior part of the abdominal wall, at the psoas and iliacus muscles, and at the quadratus lumborum: we have elsewhere recorded several instances of this kind. The margin of the swollen part is generally, in these instances, at an early stage, imperfectly defined, and although the bowels are mostly confined at the onset, apparently from sympathetic inactivity, still there is less manifest connection with the internal viscera; so also abscess in the right hypochondrium may be accompanied with jaundice, without any direct connection with the liver.

2. Cancerous disease of the cæcum is not of very rare occurrence, and its earlier symptoms are obscure; at first we were disposed to regard this instance as one of organic disease of the cæcum, but, on closely watching the course of the symptoms it was evident that the principal disease was external to the intestine; and where extension of cancerous mischief from the bowel to the cellular tissue has taken place, there is generally cæcal extravasation.

3. It was more difficult to assert whether the primary source of the malady had been in the cæcum and appendix, or in the venter of the ilium. The commencement appeared to be intestinal, and the state of the appendix cæci, thickened, and in

close contact with the abscess, showed that it had been the origin of the mischief.

There was no evidence of change in the urine, and no indication of any affection of the spinal centres or vertebræ. These sources of fallacy were excluded, and we were left to regard the suppuration as secondary to intestinal disease.

It is probable that if this patient had been young and strong, the inflammatory mischief would not have advanced to suppuration, but that adhesions and thickening only would have been the result. As to treatment, there was hope that by rest, by tonics, by opiates, and by as generous a diet as could be borne, the abscess would gradually have diminished, and ultimately have healed. In some cases, the patient can bear to turn upon the face, and facilitate the gravitation of pus to the external opening. Our patient could not bear to carry out this recommendation.

CASE 2. *Cancerous disease of the colon and duodenum; ascites; jaundice.*—Philip J—, æt. 58, was admitted into Guy's Hospital, under my care, November 25th, 1863. He had an aged appearance, and was somewhat depressed, for he had become reduced from comfortable circumstances to a state of poverty. The symptoms of disease had existed about six weeks; the abdomen had gradually become distended, and on admission fluctuation was very distinct through the parietes; at the upper part of the abdomen there was tympanitic resonance; below, dulness. At first the liver could not be felt, nor any tumour; the superficial veins were enlarged; there was no cough, no bruit at the heart, no albumen in the urine, no evidence that the ascites arose from any pulmonary, cardiac, or renal disease. Diuretics were given, but without any beneficial effect. At the beginning of January bronchitis came on, and the distension of the abdomen increased, with some pain; a systolic bruit was also heard at the heart. On the 21st, the distress being increased, and the bowels confined, Mr. Stocker gave a dose of elaterium, which afforded relief. The general symptoms remained as before, but with systolic bruit, and below the nipple a friction sound was heard; when the respiration was restrained a double impulse of the heart was visible, one in the sixth, then in the fifth intercostal space,

and presenting an undulating motion ; the pulse was regular and compressible, 90 ; there was no dyspnœa, and no cough, but he appeared more haggard, and a distressing sickness came on, so that he was unable to take solid food.

Bismuth, with soda and chloric ether were given, and colocynth and henbane to act on the bowels. On the 25th of January the stomach was very irritable, and a brown fluid was vomited ; the pulse was compressible, the tongue clean ; the friction sound heard in the cardiac region had disappeared, and the respiration was normal to the base of both lungs, but rather more distinct on the right side. Ice, and small doses of morphia were given.

On the 28th the sickness was less severe, and the abdomen was less distended, but he had several times vomited the same kind of brown substance. The bowels were confined, and a colocynth injection was administered. On the 31st the vomiting persisted, and the solution of bismuth was prescribed three times a day.

On February 3rd there was great prostration, grumous matter was still vomited, and at the stomach a hard mass could be felt, which led to the diagnosis of cancerous disease. On the 6th he was very ill ; the skin was slightly jaundiced ; food was at once rejected ; the pulse compressible ; the bowels open. *Pil. Saponis comp., gr. iiss, ter quotidie sumenda.*

On February 9th he was extremely emaciated, semi-jaundiced, pupils small, tongue clean, pulse compressible. Abdomen moderately distended, but the veins were more distinct ; fluctuation was well marked, and in the gastric region towards the right side a hardness could be felt, with imperfect resonance, but a tumour could not be mapped out ; a large quantity of coffee-ground matter was ejected, not fecal in odour. The patient said that he was perfectly comfortable, and that on the previous day he had not vomited till the evening, which he attributed to his being placed in a less recumbent position. On examination of the ejected matters, beautiful *sarcinæ ventriculi* were detected, some granular matter, and some large cells were seen filled with grains and nuclei. These latter cells resembled colloid cells.

On the 12th the patient was more jaundiced, and had a

haggard and emaciated appearance, but said that he was perfectly comfortable and free from pain. He died on the 14th February.

Inspection.—There was a considerable quantity of serum in the peritoneal sac, with general thickening of the serous membrane. The stomach was distended. On taking out a part of the viscera a large mass was found to the right of the spine, extending from the liver to the last lumbar vertebræ. This mass consisted of cancerous disease involving the duodenum and ascending colon, these parts being brought into contact by the contraction of deposit. On opening the stomach it was found to be free from disease; but the duodenum, from its commencement to the termination, was infiltrated with cancerous disease; the mucous membrane was white, thickened, tuberoso, and there was commencing ulceration. The termination of the bile duct was compressed, and the ducts throughout the liver were greatly distended; the gall bladder was also very much enlarged. The jejunum and ileum were healthy, so also the cæcum; but immediately above the cæcum, in the ascending colon, was a large mass of sloughing cancer, the size of the palm of the hand, and it partially contracted the calibre of the bowel. It was firmly united with the duodenum, but no communication could be detected. The remaining part of the large intestine was healthy. The mesentery opposed to the diseased colon and duodenum was infiltrated. There was some deposit around the pancreas, and the head of the gland was harder than usual. The spleen was healthy. In the kidneys were several large and dense cysts, but the general structure of the gland was healthy.

On microscopical examination the growth was found to consist of cells with large nuclei, separate nuclei and fibroid tissue. The section of the growth in the ascending colon presented a dark line beneath the margin; this was seen to consist of dark granular matter, as if from changed blood; beneath this was fibroid tissue, and there was a linear arrangement of the deposit, which might be compared to the infiltration of the capillaries, but no walls of vessels could be found. In the infiltrated mesenteric glands a similar linear arrangement was found.

Cancerous disease of the liver and intestines is often preceded by dyspepsia of variable duration, coming on very in-

sidiously, till at length the formation of tumour, progressive emaciation, persistent vomiting, or such symptoms, reveal the serious import of the malady.

The gradual onset of organic disease was well shown in the case just recorded; at first dyspepsia, then distension of the abdomen, from ascitic collection in the peritoneum; slowly the impediment to the portal circulation increased, fluid was evident in the peritoneum, and the superficial veins became enlarged; still later, the return of blood from the lower extremities was interfered with, the iliac vessels became distended, and the legs swelled; severe pain in the course of the anterior crural pointed out that pressure of a different kind from ordinary cirrhosis existed, and led to the supposition of solid growth before any tumour could be felt even on careful tactile manipulation. There was slight pain about the abdomen, as we often find in the chronic peritonitis of hepatic disease, and the general course of the symptoms pointed rather to the liver as the cause of the dropsy than to any other source; the later symptoms increasingly indicated the true character of the disease. There was pressure on the bile duct without pain, and jaundice steadily advanced, till a deep colour of the skin was attained; still later the duodenum was compressed, and then a tumour could be easily felt, for the distension of the abdomen had previously prevented the growth from being reached. The food was vomited several hours after it had been taken, towards the close of digestion, indicating pressure at or near the pylorus; and the vomited matters presented beautiful specimens of the *sarcinæ ventriculi*.

Some of the cells present with the *sarcinæ* closely resembled those found in colloid growth, and were possibly of cancerous formation. Prostration slowly increased, and the patient died in less than five months from the commencement of the symptoms.

The diagnosis in this case was easy, as far as indicating the presence of a tumour gradually exerting pressure upon the vena portæ, the iliac vessels, the anterior crural nerve, then upon the bile duct, and the duodenum; and there was every probability that the growth was cancerous; but the interesting fact was that the disease had commenced in the *ascending colon*, and spread from that part as from a centre. There was

scarcely any localization of the pain, and nothing especially pointed to the colon as the diseased part. The bowels were occasionally confined, but were always easily acted upon; and the administration of a dose of elaterium, by Mr. Stocker, showed how very slight the indication was of local intestinal disease; for this hydragogue was administered with the idea that the ascites was caused by hepatic disease. Still, the hypertrophy of the muscular coats of the cæcum showed that the obstruction beyond had offered some impediment.

The cancerous growth in the colon had become firmly adherent to the duodenum; and the appearance of the ejecta led me to examine carefully for any perforation, but no communication existed between the duodenum and colon. The deep-green vomited matters were not fecal, and were evidently changed bile, but were different from the substance like coffee grounds often seen at the close of cancerous disease of the stomach, and arising from changed blood. In my work on 'Diseases of the Abdomen,' I have recorded an instance of a cancerous ulcer of the colon opening into the duodenum. (Case 214, page 576.) The patient was a woman, æt. 47, and a tumour had been felt in the region of the cæcum more than four years before death; in her, diarrhœa and the discharge of fetid pus were succeeded by obstinate vomiting; the bile seemed to have passed through the communication between the duodenum and colon; and in No. 158, p. 359, an equally interesting case is mentioned having closer resemblance to the present one. A young woman, æt. 28, was affected with colloid cancer of the cæcum, gradually extending upwards so as to lead to jaundice and death. In her a tumour was felt at an early period, and it evidently implicated the bowel, for pain at the part was produced soon after taking food, especially of a fluid kind. She died in less than six months from the commencement of the prominent symptoms.

These instances are rare, but an approximate diagnosis can generally be made. The great distension of the abdomen prevented the tumour from being felt in the case now detailed, until it had attained a large size. Any irregularity of the bowels with fixed pain should be followed by thorough examination of the whole course of the colon; and it is well to see the alvine evacuations if there be any doubt as to their character.

A palliative treatment is most suitable in these cases, and the administration of small doses of sulphate of iron, in the form of pill, with henbane, if there be no irritability of stomach, has sometimes afforded considerable relief.

CASE 3. Cancerous disease of the liver ; enormous enlargement ; scarcely any jaundice ; simple chronic ulcer in the duodenum ; infiltration of bronchial glands at the root of the lungs.—Reported by Mr. Lucey.—David M—, æt. 40, a French polisher, residing at Deptford, was admitted under my care into Guy's Hospital, June 7th, 1864. His habits of life had been temperate, but his general health had not been good. He had had syphilis twenty years previously, but afterwards married and had seven children. No history of hereditary disease could be made out.

Six weeks before admission, about the end of April, 1864, he was seized with "cramp" across the upper part of the abdomen, which contracted the abdominal walls in knots ; the pain was accompanied by sickness, and the latter symptom occurred mostly after taking food. There was great flatulence ; the appetite was diminished, and the bowels were rather relaxed. At the same time, he noticed that his abdomen was larger than natural ; and the pain became so severe, that he was compelled to give up work. The urine became thick and high coloured. He gradually lost flesh, and became irritable and low spirited.

On admission, he was emaciated. There was slight sallowness, but no jaundice. The motions were dark, and the urine free from colouring matter of bile. The temperature of the surface of the body was diminished ; the countenance was dejected ; the memory failing ; the tongue was furred ; and there was occasional vomiting. The appetite was lost ; the bowels were costive. Pulse 88, regular, but compressible. No abdominal sound was heard about the lungs or heart, but there had been slight dyspnoea of late. The abdomen was enlarged, and at the upper part in the right hypochondriac and epigastric regions there was considerable projection. Irregular nodular growths could be felt, and the margin was found to be nearly three inches below the umbilicus. The curve of the right lobe of the liver could be traced ; a second curve

passed into the right hypochondrium ; and it was doubtful whether the spleen was not also enlarged. There was slight tenderness over the nodulated liver, and a distinct double friction sound could also be heard. On June 14th, there was sleeplessness, with pain over the tumour, which had increased in size. On the 17th, there was a little sickness, but very little constitutional disturbance ; still, the patient was thinner. The countenance was distressed ; the tumour was larger, three inches below the umbilicus, and three lobes could be traced on the lower margin ; the superficial abdominal veins were enlarged, especially on the left side ; there was slight tenderness ; the pulse very compressible ; tongue clean and moist.

18th.—He vomited a considerable quantity of dark grumous sour fluid. There was also slight discoloration of the skin, but less pain over the tumour. The tongue was dry ; the pulse 140, very compressible ; respiration 14. The stomach was irritable ; the patient extremely prostrate.

The irritability of the stomach partially subsided, but the prostration of strength steadily increased. The pulse, for several days before death, could scarcely be felt. Some ecchymosis took place over the surface of the tumour, and he suffered from spasmodic pain in the abdomen. A small nodular growth could very distinctly be felt in the right hypochondrium. There was slight delirium a day or two before death, which took place on the 26th June.

On inspection.—The liver was found to be enormously enlarged by carcinomatous growths, several of them projecting from the surface of the liver. The edges of the growths were raised and vascular, the centre depressed, but there was no lymph ; effused on the right lobe at the part where a rub had been heard. There was no peritonitis. The weight of the liver was eighteen pounds ; the section of the gland showed numerous cancerous growths, and their central parts were degenerating. The spleen was small. In the first part of the duodenum was a simple chronic ulcer, about the size of a shilling piece, but the intestine had evidently been compressed by the enlarged liver. There was cancerous deposit in the bronchial glands, and they were extending into the base of the lung.

This case presented many points of great interest ; the

known commencement of the malady was only nine weeks before death. The cancerous deposit rapidly increased till the liver became of an enormous size, and a very large part of its secreting structure was destroyed. Infiltration of the bronchial glands also took place, and the structure of the lung was encroached upon. In the first part of the duodenum was a simple chronic ulcer, it had thickened edges, and it had apparently existed for a considerable time; and, although the duodenum was pressed upon by the enormous liver, and the vomiting during life was principally referred to this circumstance, still we think that this diseased state of the duodenum was the chief cause of the irritability of the stomach. The coffee-ground substance rejected towards the close of life arose from altered blood, and was of the character often vomited in cancerous disease of the stomach itself. Although such extensive disease of the liver existed, there was scarcely any jaundice, for the cancerous deposit removed from the bile ducts did not cause obstruction.

The first symptom was pain in the right side, with indigestion, rapidly increasing emaciation, slight jaundice, irritability of the stomach, extreme prostration, and delirium before death.

The physical indications were clear, the liver could be distinctly traced, and the tubera were felt upon its surface. The extreme prominence of the projecting tumours suggested the possibility of hydatid disease, but the number of the tubera, their size, and the absence of the elasticity of hydatid cysts, and still more the severe cachexia, with extreme prostration, at once set aside this idea. A distinct rub was heard at the prominent part of the tumour, and was evidently produced by friction between the peritoneal surfaces. During life it was referred to lymph effused at the site of the tumour upon the peritoneum, but the inspection showed that this was not the case. The tubera were prominent, their edges were vascular, but there was no lymph; and we are led to believe that the friction of the tumour against the opposed peritoneum, led to the to and fro sound; it was very distinct and persisted from the time of his admission into Guy's.

In reference to the early formation of cancer in the liver, the question arises whether the ulcer in the duodenum was

the primary mischief, and whether the irritation consequent upon it had led to the deposition of new growth in the adjoining gland. If such had been the case, there would probably have been similar heterologous deposit in the walls of the ulcer.

As to the treatment in this case, it was felt that the mitigation of the more urgent symptoms was all that would possibly be attained; this was done by the administration of small doses of morphia, the irritability of the stomach was lessened by soda, hydrocyanic acid and henbane, and by a carefully regulated diet as nourishing as he could bear, and with stimulants as far as they were practicable.

CASE 4.—*Extensive cancerous disease of the stomach and liver; no vomiting.*—John E—, æt. 49, was admitted into Guy's Hospital, September 5, 1860. He had resided at Norwood, and on March 1st, after exposure to cold in a railway train, he was seized with excessive pain in the stomach; there was neither vomiting nor purging, but he became anæmic and emaciated.

He was a tall spare man, very anæmic and sallow, but he had not lost any blood. On admission he was very prostrate, and he was greatly exhausted. The abdomen was full, and exceedingly tender in the region of the liver, especially above the anterior extremity of the tenth and ninth ribs; below this part there was a rounded projection or nodule, and dulness on percussion. He had never had any vomiting. The symptoms of pain and increasing prostration persisted till his death on September 13.

On Inspection.—In the left pleura there were about two pints of turbid serum containing some flakes of lymph. The right lung was in a state of hypostatic congestion; the left was fleshy and compressed. There were some cancerous tubercles in the left pleura. *Stomach.*—Contained a mass of cerebriform cancer about the size of the palm of the hand, involving the whole of the lesser curvature to the peritoneum. The serous membrane was slightly puckered. The growth was defined towards the pylorus, but the valve was free; the œsophageal opening passed into the cancerous mass; at the part nearest to the pylorus, the mucous membrane was destroyed, but the surface was smooth. The glands at the lesser curvature were

involved, so also those in the meso-colon ; other cancerous tubera were found both on the surface and in the substance of the liver.

The sudden attack of pain in this case probably indicated, not the commencement of the disease, but its extension to the peritoneum ; and this sudden onset of severe symptoms is by no means rare in cancerous disease of the stomach. There was great tenderness at the part, the peritoneum was puckered, and the persistence of the pain indicated that more than the mucous membrane was involved, for where that is the especial seat of cancerous disease the pain is more or less paroxysmal, and it is modified by diet.

Another remarkable symptom was the absence of vomiting throughout the case, although there was such extensive cancerous disease. This circumstance was explained by the healthy and uncontracted state of the pyloric valve, but it is surprising that from the manner in which the œsophagus opened into the diseased mass regurgitation of food did not occur.

The pleuritic effusion from cancerous tubercle hastened the fatal result.

The anæmia was extreme, and it was supposed that some internal hæmorrhage must have taken place, but since nothing of the kind was detected before or after death, we are led to attribute the state of the blood to the interference with general nutrition.

CASE 5.—*Abdominal tumour in the right loin ; calculus in the kidney ; chronic pyelitis for about fifty years ; cancerous disease of kidney ; extension through the diaphragm ; death from acute pleuro-pneumonia.*—William M—, æt. 66, a shoemaker, a man of quiet habits, when thirteen years of age began to pass blood in his urine, and to suffer from pain in the right side ; at thirty the symptoms subsided ; but at forty-four years of age he again suffered from weakness and pain in the right side, and passed mucus in the urine. There was no pain in the penis, nor in the testicle. During the last twelve years there had been pain in the side, and for four years the urine had been purulent. In May, 1864, the strength failed, the water became thick, micturition frequent, and the

pain came on in severe paroxysms, so that he was scarcely able to do any work.

On September 22nd, 1864, he had an anxious countenance, and was pale and emaciated. There was severe pain in the right side, right loin, and shoulder; the urine was thick, and consisted of blood, mucus, and pus. There was a large tumour in the right loin, extending forwards as far as the right of the umbilicus, and downwards to the cæcal region; it was especially prominent at the lower part, and was there more tender than elsewhere. The patient stated that the tumour sometimes became larger and more painful, then an abundant discharge took place with the urine, the tumour afterwards lessened and the pain subsided. Attacks of this kind came on every few days or weeks, and occasionally the urine became quite clear. The heart's action was feeble, but there was no evidence of disease in the chest; the bowels were regular, and the appetite tolerably good.

He was ordered the potash tartrate of iron, with Rochelle salt and tincture of opium.

On October 7th no pus was passed, the tumour had enlarged, and the pain was very severe. He was then admitted into Guy's Hospital. The tumour was then very prominent in the cæcal region, and fluctuation could be felt in it; it was very tender; there was general dulness, and the cæcum and ascending colon were apparently pushed aside. He was greatly emaciated, the tongue was clean, the bowels confined, and the pulse compressible. He had no cough and no swelling of the legs. The pain was partially relieved by opium, and the bowels were acted upon by enemata and by castor oil. Stimulants and nourishment were given as the patient could take them. During November the pain in the tumour increased, and extended into the loin and right hypochondrium; the tumour became more irregular in form, but its size varied according to the discharge by the urine; the urine sometimes became quite clear and free from albumen; generally it was red, thick, and containing large quantities of mucus and pus. There was no pain in the testicles, nor sickness, nor was there great irritability of the bladder. At the beginning of December he had some pain in the front of the right thigh. During the last few days of his life the pain became very severe in the right side, the right leg swelled,

his strength rapidly failed, he became unable for several days to swallow food, and he sank on December 17th.

Inspection was made on the 19th. The head was not examined. There was acute pleurisy on the right side, and a soft medullary growth extended through the diaphragm at its posterior part. The growth consisted of soft cancer-tissue, with clots of blood. A soft cancerous mass was also found in the right lung, and in several parts the right lung was pneumonic. The left lung was healthy; the heart was small, and there was slight atheroma of the valves. The liver was healthy, except near the diaphragm, where was soft medullary cancer extending into the gland; the pancreas was healthy; and there was no effusion into the peritoneum. An irregular tumour occupied the right loin, extending as far as the median line in front; the ascending colon and cæcum were pushed inwards and were healthy. The tumour consisted of the distended pelvis of the right kidney, forming irregular, almost separate cysts with dense fibrous walls, and filled with red mucus and pus. The kidney was spread out, and at its posterior part soft cancerous growth was projecting into it, connected with the mass reaching the liver and pleura. An elongated calculus, with foliated rough surface, was found in the pelvis of the kidney; the right ureter was distended to the size of a coil of small intestine, but the bladder was healthy, so also the left kidney.

There are many points of great interest connected with the pathological history of this case. A calculus was formed in the right kidney during early youth, for at thirteen he began to pass blood in the urine; unfortunately it remained in the pelvis of the kidney, gradually increasing in size and perpetuating the irritation. It would seem that the calculus became partially encysted, for the symptoms several times subsided for lengthened periods of time; at thirty years of age he had comparative quiet for fourteen years, then a fresh exacerbation was followed by several years of ease. Still the irritation remained, and chronic suppuration of the pelvis of the kidney was set up; the kidney structure became gradually destroyed by distension, and an irregularly divided cyst was nearly all that remained; in fact, it was a chronic abscess, and the remaining kidney performed for many years the whole excretory office of the glands. The cyst underwent great distension, for it had

attained an enormous size, and its walls were dense and fibrous; the ureter was also greatly enlarged. The calculus was elongated, about an inch and a half in length, having an irregular and foliated exterior; it had probably occluded the entrance of the ureter, thus leading to distension, and suppuration, until the cyst having become enormously enlarged, a passage was made for the discharge of its contents.

Thus, for more than fifty years, the symptoms went on, gradually undermining the strength and exhausting the energies of the sufferer. Another very interesting fact was the development of cancerous disease; this was a form of medullary growth; it extended into the diseased kidney, and reached upwards to the diaphragm, thus proving the immediate cause of the last fatal aggravation—the attack of acute pleurisy from perforation of the diaphragm.

The diagnosis was in part clear, for the pain in the right loin, with the repeated discharges of purulent mucus with blood, led to the belief in chronic disease of the pelvis of the right kidney. The abdominal tumour, as it passed from the loin and reached the median line to the right of the umbilicus, showed the disease to be in the neighbourhood of the kidney. It had the form of cancerous disease of the lumbar glands, but the discharge of pus in the urine, and the diminution in the size of the tumour after the partial evacuation of the contents of the cyst, showed its true character. Still, the association of cancerous disease with this chronic pyelitis was discussed during life, but was not satisfactorily made out. On the examination of the abdomen the tumour was uniformly dull, showing that the cæcum and colon had been pushed aside, and also that the bowel was free from implication; the bowels acted easily and generally without medicine, and the processes of digestion were accomplished without pain. There was no symptom to indicate any affection of the intestinal tract.

The treatment during the later months of life was purely of a palliative character, but at an earlier date we believe that much might have been effected. The great objects of treatment would have been to ensure the encysted character of the calculus, and thus remove the source of irritation. The impoverished circumstances of the patient, his constant laborious work as a shoemaker, and probably his second marriage,

favoured the dislodgement of the calculus; rest, and freedom from all sudden movement, were the most important means to effect the encysting of the stone.

Again, a carefully regulated and generous diet, with tonics as he could have borne them, might have diminished the discharge, and sustained him under its constant drain; here, too, circumstances precluded these advantages. Thus, also, the cachexia which preceded the deposit of medullary cancer, might have been averted or its influence lessened.

CLINICAL REMARKS ON DISEASES OF THE SKIN.

By S. O. HABERSHON, M.D.

If disease be considered in its tendency to shorten life, it will be universally acceded that those maladies which affect organs essential to the regular exercise of the necessary vital functions are of greater importance than those of every other kind; thus, that affections of the brain and the nervous centres deserve greater attention than of the mere investments of those parts; and, regarded as to their functional value, such structures as the heart and lungs are of greater moment than the skin and the parietes of the chest; but whilst this view may be perfectly correct, we have also to bear in mind that the changed appearance of the skin may be the expression of more serious internal defect, as in smallpox and scarlet fever; and also, that a very great amount of suffering is induced by many conditions which do not directly shorten life. It is for these reasons that cutaneous diseases deserve special attention, and even more than they have hitherto received. A condition of the skin which in itself may be of comparatively little moment, becomes important when it indicates a constitutional taint—as syphilis—although there may be no pain, nor distress of any kind as its consequence. The cutaneous surface may show disease of the blood or its imperfect depuration, as the yellow colour of the skin in jaundice indicates obstruction of the gall-ducts, or the imperfect elimination of biliary elements; and the effusion of blood into the skin in scurvy and purpura

is a certain proof of blood disease ; again, the skin may afford us a sure criterion of general organic defect, as in the existence of strumous and of cancerous disease.

The same disease of the skin is modified by numerous circumstances, and it would be very easy to multiply names, almost to an infinite extent ; the age of the patient stamps a different character on all these maladies, and the general vigour of the constitution, or its failing power, place the same malady under new names, as well would it be in bronchitis to give an altogether different name to the disease when mucus and when pus are respectively expectorated ; the climate, the race, the existence of hereditary or acquired disease, all exert an influence upon the changes which take place in the body, whether on the surface or in internal organs. The more accurately, however, that facts are observed, and the deeper that research extends, the sooner shall we be able to ascertain those general laws which regulate the varieties and the respective forms of these diseases. Imperfect observations have led to empirical treatment, and have retarded scientific knowledge.

There cannot be a greater mistake than to rest content with merely naming the disease, without regarding it in its constitutional relationships and differences ; there has been great confusion produced, without commensurate advantage, by the extreme subdivision of the nomenclature according to every observed difference in their external arrangement.

The classification adopted by Willan and Bateman was founded upon the elementary appearance presented by the skin during diseased action ; and it is a great assistance in forming our diagnosis to remember these divisions ; that is to say, what diseases are really vesicular or otherwise, although in several particulars they are not strictly correct ; thus scabies does not always present pustules, and porrigo never does so, and the class “tubercula” is still less in accordance with recognised facts.

The arrangement of Willan and Bateman was as follows :

ORDER I.—*Papulæ.*

Stropulus, lichen, prurigo.

ORDER II.—*Squamæ.*

Lepra, psoriasis, pityriasis, ichthyosis.

ORDER III.—*Exanthemata*.

Rubeola, scarlatina, urticaria, roseola, purpura, erythema.

ORDER IV.—*Bullæ*.

Erysipelas, pompholix, pemphigus.

ORDER V.—*Pustulæ*.

Impetigo, variola, porrigo, scabies, ecthyma.

ORDER VI.—*Vesiculæ*.

Varicella, rupia, vaccinia, miliaria, herpes, eczema.

ORDER VII.—*Tuberculæ*.

Phyma, sycosis, verruca, lupus, molluscum, elephantiasis, vitiligo, acne, frambæsia.

ORDER VIII.—*Maculæ*.

Ephelis, spilus, nævus.

This method has been corrected and improved by the modifications of Bielt, Schedel, Gull, and Hillier, whilst a more natural classification has been followed by Alibert, Hebra, Cazenave, Startin, Hardy, Wilson, Buchanan, Fox, &c. It would be easy to point out defects in every arrangement; and equally easy would it be to show that each have their respective merits; but we are convinced that with advancing knowledge, the natural arrangement will take the place of that which is artificial.

When a considerable number of skin diseases are presented before us, the mind almost involuntarily separates those which are of a local from those of a constitutional origin; but here difficulty arises at once, for nearly every local disease of the skin may be shown to be modified by the state of the constitution. Still it is well thus to discriminate, for in the essentially local malady the treatment must also be local.

In this first division of local complaints there are those produced, first, by animal and vegetable parasites; second, by changes of the individual structures of the skin; whether of *pigment*, as in ephelis lentigo; of *sebaceous glands*, as in acne, molluscum, comedo, strophulus albidus; of *sweat glands*, as in miliaria, sudamina; of *papillæ*, as in warts; of the *lymphatic vessels*, and of the *fibro-cellular* tissue. Third, other local

changes affect all the structures of the skin, as in local erythema, from intertrigo or dermatitis.

The second division of diseases of the skin comprises those which are expressive of some constitutional change or defect. Among these we would place together, as "par excellence" *constitutional*, several conditions closely allied to struma. 1st. Scrophulous disease, whether of an erythematous and furunculoid character, or lupus. 2nd. Leprous, comprising the ordinary forms of lepra and psoriasis : and 3rd, Eczematous (in the acceptation of M'Call Anderson), including lichen, true eczema, impetigo, and pityriasis. In these the general treatment is the more important, but that which is local is also of great value.

Next, *exanthems*, in which acute blood changes probably are taking place, and in which the affection is watched rather than treated. It is convenient to arrange exanthems into three divisions: first, those which are contagious, variola, vaccinia, varicella, rubeola, scarlet fever, typhus and typhoid fevers, erysipelas. Second, non-contagious; erythema, roseola, urticaria, herpes, pellagra, frambæsia. Third, exanthems from known poisons, mineral, as arsenic; vegetable, as the oleo-resins; animal, as in pyæmia, glanders, malignant pustule.

Another class consists of those eruptions which may be designated *cachectic*. In some, it would seem that general nutrition is at fault, as in rupia, ecthyma, and pemphigus, in furunculus, carbuncle, and leprosy; in others, that the blood is defective in some essential ingredient, as in purpura and scurvy; and again, impaired nervous energy may be the cause, as in some forms of prurigo, in melasma. In all these pure air, generous diet, and tonic remedies are of essential service.

Syphilitic eruptions constitute another distinctive class, of whatever form they may be, whether congenital or otherwise; the form may be erythematous, lichenous, warty, fibroid, rupial, ecthymatous, pemphigous, scaly, or tubercular; and not unfrequently other cutaneous diseases become changed by the presence of syphilitic taint.

Cancerous diseases of the skin are equally distinct, whether epithelioma, cancrioid, melanosis, or scirrhus.

Congenital peculiarities, or defects, must also be regarded as departures from the normal standard, and they thus constitute

disease; and here we must especially enumerate ichthyosis, moles, and nævi.

I. LOCAL DISEASES.

1. *Animal parasites*—

Scabies, from *Sarcoptes hominis*.

Prurigo, from pediculi, &c., &c.

Vegetable parasites—

Tinea favosa, from *Achorion Schönleinii*.

Tinea tonsurans, from *Trichophyton tonsurans*.

Herpes circinatus, " "

Tinea decalvans, from *Microsporon audouinii*.

Sycosis, from *Microsporon mentagrophytes*.

Pityriasis versicolor, from *Microsporon furfur*.

2. *Changes of individual structures.*

Pigment in ephelis, lentigo, vitiligo, leucoderma.

Sebaceous glands, in acne, molluscum, comedo, strophulus albidus.

Sweat glands, in miliaria, sudamina, &c.

Papillæ, in warts.

Lymphatics, in Barbadoes leg, elephantiasis.

Fibro-cellular tissue, in keloid and scleroma.

3. *Local inflammation of the skin.*

Erythema, as intertrigo, erythema læve.

Dermatitis.

II. CONSTITUTIONAL DISEASE of a Strumous kind?

1. *Eczematous*, lichen, eczema, impetigo, pityriasis, or papular, vesicular, pustular, and scaly forms of eczema.
2. *Leprous*, ordinary lepra and psoriasis.
3. *Strumous*, in erythematous, and furunculoid forms, and lupus.

III. EXANTHEMS—acute blood changes.

1. *Contagious*, variola, vaccinia, varicella, rubeola, scarlet fever, typhus and typhoid fevers, erysipelas.
2. *Non-contagious*, erythema, roseola, urticaria, herpes (?), pellagra, frambæsia (?)
3. *From poisons*, mineral, vegetable, and animal, the last comprising pyæmia, glanders, malignant pustule.

IV. CACHECTIC RASHES :

1. *Defective general nutrition*, rupia, ecthyma, pemphigus, furunculus, carbuncle, leprosy ?
2. *Defective blood conditions*, purpura and scurvy.
3. *Defective nerve supply* ? melasma, prurigo senilis, &c.

V. SYPHILITIC ERUPTIONS :

Congenital, erythematous, lichenous, warty, fibroid, rupial, ecthymatous, scaly, tubercular.

VI. CANCEROUS ERUPTIONS :

Epithelioma, cancrioid, melanosis, scirrhus.

VII. CONGENITAL DISEASE :

Ichthyosis, moles, nævi.

During the year more than a thousand cases of cutaneous disease have presented themselves amongst the out-patients at Guy's, and although as mere statistics they have very little value, some general facts of interest have been brought out. As to the cases generally, many acute diseases are not found amongst out-patients, as for instance, the exanthems of scarlet fever, smallpox, &c. Again, many men are so engaged in their daily avocations, that they cannot spare the time to attend for the cure of milder forms of disease ; and lastly, very numerous milder cases have been prescribed for without any note being taken of them ; many cases of scabies, as well as of eczema have been thus dealt with.

Taking the order we have previously described, local diseases from animal and vegetable parasites are first mentioned.

1. *Scabies*, from the itch-insect, *Sarcoptes hominis*. Of 500 cases of skin disease only sixty-five were cases of scabies, which is explained by the facts just mentioned ; and only about ten were instances of severe scabies purulenta. This disease is generally very distinctive ; severe pruritus, when the surface becomes thoroughly warm, is associated with distinct acuminate vesicles of a pale reddish colour, situated between the fingers, or on the feet, on the anterior surface of the abdomen, at the flexures of the joints, or on the buttocks ; more distinctive

still is the furrow produced by the female insect, in which its eggs are deposited; this furrow extends two to six lines, in a straight or curved direction from the vesicle, and at its extremity contains the insect; and more conclusive still is it to turn out the insect, or to find the eggs by microscopical examination. But there are difficulties in the diagnosis of some of these cases, and for several reasons: scabies not only has its peculiar papulæ or vesicles, but it is often associated with *true eczema in its papular or vesicular form*; the scabies may be cured, but the eczema persist; in eczema the vesicles are more clustered, of a redder colour at their base, and often leave a raw and oozing surface; eczema also is found upon the head and face, and behind the ears, which are localities rarely, if ever, affected by scabies, although it has been found upon the face.

In *prurigo*, whether produced by pediculi, or from other causes, the papulæ are larger, the back and shoulders are frequently the parts affected; points of dried blood, from the severe pruritus, are found on the summits, but none of the furrows of the itch-insect are present; the itching is more severe also than in scabies. Still more difficult is it sometimes to distinguish another form of *papular eczema* from scabies, namely, *strophulus pruriginosus*. Several of these cases have presented themselves before us in delicate strumous children, the trunk, back, and abdomen being especially affected: they had generally been treated previously with sulphur ointment, but only with partial benefit; in some instances, however, although not scabies, the sulphur has been of service. The internal treatment in these cases should never be forgotten.

In a few of the instances of scabies, cachectic rashes have been also present; blebs of rupia, and pustules of ecthyma, both indicating the defective state of the general health of the patients.

Although it is perfectly true that sulphur ointment, with proper cleanliness, will destroy the itch-insect, and cure the disease, we have found many cases difficult to cure from the poverty of the patient; they will rub in the ointment, and wash with soap and water from head to foot, but they put on the same clothes, without any depurative measures of stoving or purifying having been performed, and in a few days the disease is

found still to exist, the insect or its newly-hatched progeny having returned to their old haunts.

2. *Prurigo* from pediculi. Although we cannot agree with Dr. B. Squire that pediculi exist in nearly every case of prurigo, we have very frequently found them, sometimes when they were very little suspected, and even when the patients had been for months under the care of experienced dermatologists. A few cases were in young children, but the greater number were in persons beyond the middle of life and several in aged people. Attention to hygienic rules and cleanliness has sufficed to cure the disease, but the cure was generally assisted by an ointment of white precipitate with sulphur.

3. *Vegetable parasites, dermatophyta*, including *Tinea favosa*, the porrigo lupinosa of Willan and Bateman, from *Achorion Schönleinii*; *Tinea tonsurans* and herpes circinatus, the former the porrigo scutulata of Willan and Bateman, ordinary ring-worm, and produced by the *Trichophyton tonsurans*; sycosis from *Microsporon mentagrophytes*, and pityriasis versicolor from the *Microsporon furfur*.

Tinea favosa is less common than other varieties. The single case presented had been in the hospital previously, a cachectic young man, aged 22, in very indigent circumstances; nearly every spring the favous cups were reproduced about the few hairs that remained. The cups were both isolated and they had aggregated in masses; they were seen on the head as well as on the limbs; the crusts could be removed without much difficulty, and left a depression of red tender skin, but they soon reformed. The vegetable character of the growth was beautifully shown, and it continued to grow for some time after being placed between microscopical glasses. The improved diet of the hospital greatly assisted in this patient's recovery, for as an out-patient very little improvement was made. He suffered much from severe pruritus at the diseased parts, but this disappeared when the crusts were removed.

Many cases of *tinea tonsurans* presented themselves, and the bald circular patches on the head showed broken, wasted, and twisted hairs, with swollen follicles and erythematous or slight scaliness at their circumference; in many instances the spores of the *trichophyton* were easily detected; in several herpes circinatus of Willan also existed, and in one it affected

the fingers and nails from nursing a child with tinea; this latter disease we have often seen affecting the fingers and the palm of the hand, and it might readily be mistaken for erythema, or for psoriasis in a mild form.

Few diseases of the skin require greater care than ordinary tinea tonsurans, in order that it may be completely eradicated; and this is especially the case when the disease only affects a few hairs in isolated patches without producing well-marked bald places. Unless the utmost watchfulness be used, the disease may linger for many months.

In the treatment, removing the whole of the diseased hair bulbs is doubtless the most effectual remedy, but it is not possible always to effect this, nor is it necessary. In very young children we may employ milder measures than when the disease has become established and the children are older; thus, removing the hair from the circumference of the affected part, using thorough cleanliness, and applying simple unirritating ointment of zinc with lead cerate will suffice; the same ointment may be used to most of the instances of tinea circinata; or the dilute solution of the diacetate of lead. In older children, or when the disease has lasted for several weeks, it is well to cut the hair off around the baldness, and if there be several parts affected, to have the head shaved; I have found the best application to be, \mathfrak{zj} - \mathfrak{ij} of ointment of cantharides, with the same quantity of nitric oxide of mercury or white precipitate ointment, and \mathfrak{zss} of simple sulphur ointment, rubbed in every or every other morning, alternating with simple zinc ointment, and maintaining perfect cleanliness. In some cases the acetum cantharidis made with glacial acetic acid may be used instead of the blistering ointment, and be applied every second morning, using the mercurial and sulphur ointment night and morning. The solution of the corrosive sublimate, gr. \mathfrak{ij} to \mathfrak{iv} , in \mathfrak{zj} , with several grains of hydrochlorate of ammonia, is a favorite application with some, but I have found the ointments previously mentioned more effective.

It is easier to cure an isolated patch of ringworm than to prevent its extension to other parts, and the greatest watchfulness, cleanliness, and care are required in this respect; for whilst a single broken hair remains, or one that is stunted and twisted, the disease is not eradicated, and after several

weeks of supposed immunity the disease reveals itself in fresh bald patches. The manner in which the hair follicle became filled with spores, and so induced wasting of the hair, was beautifully shown in many instances, the bulb often becoming quite pointed; the spores also extending upon the hair itself; the shaft of the hair often irregular, and the extremity broken or fibrous; in other cases the whole hair was atrophied.

None of the cases presented any true vesicles or pustules, and the scaliness either at the edges of the follicles, or at the circumference of the patch, was but slight; more frequently a furfuraceous condition was presented in other parts of the scalp without alopecia, and in some the scales had adherent sporules.

None of the cases during the year had the marked characteristics of *Tinea decalvans* or *Alopecia areata*, although some cases of *T. tonsurans* had smooth, shining baldness; it may be doubtful whether we have not in these conditions different stages of the same disease.

Four cases of *Sycosis*, have presented themselves during the year, but only one appeared to be true sycosis; for two years pustules had existed at the root of the hairs of the chin, with some thickening, and the examination of the hair showed the same form of sporule as in the *Tinea tonsurans*. In another instance, the disease was manifestly eczematous in its character; in a third, the upper lip presented impetiginous pustules with hairs passing through them. Pulling out the hairs in the first case afforded speedy relief, in which sundry applications had been made without any benefit for many months.

Four instances of *Pityriasis versicolor*, three in men aged 35, 37, 28, and a woman aged 67, have applied for relief; in one, the epithelial scales from the brown patch on the chest showed, when treated with dilute potash, and placed under the microscope, the spores of the *Microsporon furfur* very beautifully. The treatment we have used with almost uniform success has consisted in the application of a lotion of the hypsulphite of soda ℥j to pint of water.

In the class of *local* diseases arising from *changes of individual structures*, we might refer to instances illustrating nearly every form; cases of *ephelis* need no notice; one case of

vitiligoidea presented itself in a woman who had jaundice during pregnancy; there were parchment-like patches beneath the lower eyelids, and numerous minute tubercles were present on the hands; another interesting case simulating *vitiligoidea tuberosa* was found in a man aged 47. He had been of intemperate habits, and twenty-five years previously he had syphilis; there were spots of purpura upon him, but at the elbow and immediately above the patella there were yellowish tubercles very slow in growth; others also existed on the right foot; after several months the tubercles above the knee coalesced, and became of a deeper shade and of an uniform red colour. It would seem as if a purpurous condition from hepatic disease, the result of intemperance, was modified by syphilis. He did not bear any form of mercurial, but was greatly relieved by tincture of the sesquichloride of iron.

Sebaceous glands.—The instances of acne that applied for relief were those especially affecting the face. Several were in young women with defective menstruation; in others the acne was associated with chronic lichen on the face, and in one the enlarged sebaceous follicles was followed by atrophic pitting; this instance is again referred to in speaking of struma. The most appropriate treatment consists in removing any constitutional defect by chalybeates and aperients; and at the same time a stimulating wash may be applied to the affected part, as the bichloride of mercury, gr. j to ℥j.

Before leaving these diseases of individual structures I may refer to an interesting instance in which the fibro-cellular tissue constituting the cicatrix of a burn became hypertrophied, so as to form a projecting irregular mass over the pectoral muscle. In this case of spurious keloid the intolerable itching was a most distressing symptom, and was unrelieved by any external application. A case of ordinary keloid was found in a girl aged 17; an elongated cicatrix-like mark existed from the nose to the vertex. It had lasted two years, and there was slight numbness.

The next general division comprises CONSTITUTIONAL DISEASE, and we have placed together the several forms of eczema, in their papular, vesicular, pustular, and scaly varieties, with lepra and with strumous disease. In struma the changes are

essentially degenerative, consisting in the infiltration of low organized deposit, followed by atrophy, ulceration, or suppuration. In lepra, the condition is one of epithelial hypertrophy; in eczema exudation takes place, and the pathological state is allied to inflammation. We do not mean that these diseases are identical, for they differ in their symptoms, their course, and their termination, but that they are of the same family, and are often associated the one with another. Strumous subjects are more prone to eczema and lepra than others, and struma renders these diseases more obstinate. The arrangement of M. Hardy in placing lichen, eczema, impetigo, and pityriasis, together as forms of dartrous disease, seemed to me a judicious method; and with great interest I have regarded the work of Dr. M'Call Anderson of the same kind, the only regret being that confusion may arise from the use of the word eczema to express a general, rather than a special class of disease.

We will take first this dartrous or eczematous class of disease, comprising lichen, eczema, impetigo, and pityriasis, or the papular, vesicular, pustular, and scaly varieties of *eczema*. They are constitutional in their character, although often induced by some local excitement; they produce severe itching; they are chronic in their duration, and are very apt to recur; and although they lead to some thickening they do not cause ulceration. In their inflammatory state they are relieved by salines, and by tartar emetic; in their chronic and asthenic forms, by dilute mineral acids, by the preparations of arsenic and steel; and although the constitutional treatment is very important, the local should never be disregarded, and is often greatly instrumental in affording relief.

Lichen or Papular Eczema.—Willan and Bateman define lichen as “a diffuse eruption of red papulæ, sometimes distinct, sometimes in clusters; accompanied with a troublesome sensation of tingling or pricking, and usually terminating in scurf; recurrent, not contagious.” Seven species are enumerated, *L. simplex*, *L. circumscriptus*, *L. agrius*, *L. lividus*, *L. tropicus*, *L. urticatus*; *L. pilaris* may be omitted as having to do with the condition of the hair follicle rather than constituting a truly papular form of dis-

case, still there is papular exudation and enlargement, and it may be with desquamation of the cuticle resembling pityriasis. Strophulus or red gum is also a papular eczema—"an eruption of pimples in early infancy, chiefly on the face, neck, and loins, generally in clusters, surrounded with a reddish halo." *Str. intertinctus*, *confertus*, *volaticus*, and *candidus*, are varieties according to the size of the papules, their colour, their aggregation, and their recurrence. *Strophulus albidus* consists of obstruction of the sebaceous follicle and its gradual distension. Nearly all writers on diseases of the skin refer to the presence of vesicles in severe lichen, and nearly every case of true eczema in its vesicular form presents enlarged and inflamed papulæ. It would give a very imperfect idea of the frequency of lichen were we to state that from 500 cases 40 to 50 were instances of lichen, for nearly every instance of eczema had enlarged papules at one or other part. If we apply the term strophulus to the lichen of early life, we shall find that nearly all the forms of the disease described by Willan and Bateman are acute in their character, and induced by local irritants, disturbance of mucous membranes, improper food, and in several instances had followed vaccination; but there are other forms, and one of these more enduring varieties of strophulus or lichen in young children has been called by M. Hardy, pruriginous strophulus; several instances of this troublesome complaint in its chronic form, have presented themselves, essentially lichenous in their character, intense itching is a common symptom, the back and abdomen are often affected, numerous papules are observed, and the young patient by constant rubbing during the night causes abrasion, and points of effused blood are detected. This disease has frequently been mistaken for scabies, and in some cases it is relieved by sulphur; but the disease does not present any of the peculiar symptoms of scabies, it is on the back or face, &c.; no vesicles are usually present, no furrow of the itch-insect; under treatment it will subside in a week or ten days, but it soon returns and for months continues to trouble the patient. I have generally found that removing all source of irritation of the mucous membrane constitutes a most important part of the treatment: for instance, in one which had existed for two or three years, and had been treated by all

forms of remedies, sulphur ointment and baths, &c., before it came under my care, the rhubarb julep of Guy's (rhubarb, soda, and calumba), with oxide of zinc dusting powder, afforded more relief than any previous remedy.

Of the lichen of adults, some were acute, and were produced by irritating applications or exposures, or by disturbance of the digestive organs; several instances of chronic lichen on the face were associated with acne, and were of a very obstinate character; in proportion as the sebaceous follicles were affected there was less itching, but in others the pruritus was a very troublesome symptom. Some of these have been greatly relieved by the internal use of arsenic, and others still more so by the internal administration of solution of potash; as to external remedies, glycerine, or the ointment of the nitric oxide of mercury, or the solution of the bichloride, were most useful.

True eczema, or the *vesicular form* of M'Call Anderson, is defined as "an eruption of minute vesicles, not contagious, crowded together; and which, from the absorption of the fluid they contain, form into thin flakes or crusts." "When limited to the fingers, hand, and part of the forearm, it is not unfrequently mistaken for scabies; but it may be distinguished by the appearance of its acuminate and pellucid vesicles, by the closeness and uniformity of their distribution, by the absence of surrounding inflammation and of subsequent ulceration; and in many cases by the sensations of smarting and tingling, rather than of itching, which accompany them." Three varieties are given by Willan and Bateman: *E. solare*, *E. impetiginodes*, *E. rubrum*.

The 500 cases comprised 174 of vesicular eczema, but amongst these are included several very different conditions. The eczema of children should be separately regarded, and so also the acute eczema of adults should be distinguished from the chronic form.

In children, eczema commences by papular roughness of the skin, with redness, heat, and itching of the skin; in a short time vesicles appear, very small in size; these increase in distinctness from the effusion of serum, which gradually becomes opaque. The vesicles break, exposing a raw oozing surface, and discharge a serous fluid, which "stiffens the linen which absorbs it;" scaly

crusts are formed by the drying up of this discharge, and when upon a part covered with hair they form a thick crust, which emits a sickening odour, and is associated with severe itching. This state is very frequently observed on the scalp and face of infants and young children, as well as upon the face, behind the ears, at the flexures of the joints, and in other cases on the abdomen and buttocks. Nearly all these instances are produced either by direct irritation of the skin, or by improper food. As to the former, we very often find that the "best yellow soap" has been applied most unsparingly, and continued after the vesication had appeared—the delicate skin of infants is unable to bear the irritant and solvent effect of the coarse soap; sometimes a thick crust of dirt irritates the skin; or again, the ignorant parent is found to be giving to the infant just weaned, or even at her breast, meat and beer, &c., irritating and inflaming the mucous membrane, and disturbing the whole system. In many of these children the vesicles become purulent and impetiginous, and it is then designated *eczema impetiginodes*. When the scalp is affected the crusts adhere together, and in young children the hair becomes atrophied; in other children the crusts often become infested with pediculi, the sequence, we believe, not the cause of the eruption. This form of disease is more obstinate in strumous children, and in them may be set up by vaccination; when the face is affected, thick patches may be produced, the *crusta lactea* of former writers; the ears are also frequently affected. Again, it will be generally found that enlarged and inflamed papules exist at the circumference of the diseased part, or upon the neck and arms, so that it is exceptional not to find lichenous eruption with the vesicular. In *eczema impetiginodes*, also, the glands at the back of the neck often become inflamed and suppurate. In the treatment of these young patients, the most important consideration is to avoid all sources of irritation to the skin, and to give bland and proper diet. I have used with great advantage in these cases an ointment long since recommended by the late Dr. Addison, consisting of equal parts of the zinc ointment, and of the cerate of the acetate of lead of the London Pharmacopœia, gently washing the affected part previously with milk and water, or gruel or bran water. In some instances the simple oxide of zinc dusted upon the part is more soothing.

As to internal remedies the diet must be carefully regulated, milk and bland farinaceous food given; if the mucous membrane be irritated, as shown by the state of the nose, the mouth, the condition of the stomach and bowels, and by febrile remissions at night, the bicarbonate and chlorate of potash are of great help; and in those instances which are more persistent after the subsidence of the first acute symptoms, and free from all symptoms of gastro-enterite, great benefit accrues from the use of very small doses of arsenious acid, either as Fowler's solution, or the solution of arseniate of soda, to an infant giving only a quarter or half a minim.

Amongst adults also some interesting cases of acute eczema were observed; in several, in young strumous patients, the calves of the legs, the hams, the feet, were only affected; but in others, the skin of the hands and forearms were inflamed and eczematous from the direct application of irritating fluids; but these instances, although the arms were covered with innumerable vesicles, soon subsided under appropriate treatment. In one, a hatter, aged fifty, the eczema was apparently produced by the application of acetate of copper in his work.

In its chronic form, eczema is a very troublesome disease, and it is very apt to recur, and with repeated relapses may continue for several years. In the treatment of chronic eczema the dilute mineral acids are often of great service, and still more so the preparations of arsenic; but in some patients arsenical medicines in any form are detrimental rather than otherwise, and we have found the greatest benefit in these from the use of very small doses of tartar emetic in the decoction of sarsaparilla. In anæmic subjects chalybeates may be tried, and when there are febrile symptoms we have given with success free doses of the solutions of potash.

As to external treatment, the applications used in the acute disease may be tried first, the oxide of zinc powder, or zinc and lead ointment; but in chronic forms of local eczema, more powerful remedies are sometimes of great service; for instance, the part may be painted over with solution of potash diluted with two or three parts of water. In one case of this kind that appeared amongst the out-patients, a solution of too great strength had been applied, for it had destroyed the tissue of the skin and left an unsightly cicatrix. Glycerine often pro-

duces pain, and patients affected with eczema cannot always bear its application. The tar and creasote ointment are in the chronic forms sometimes productive of great benefit.

Impetigo, or the pustular form of eczema. Willan and Bateman define impetigo as an "eruption of yellow itching pustules, appearing in clusters, and terminating in a yellow, thin, scaly crust." They add, "the affinity of impetigo with the vesicular diseases is manifested by a common variety of it in the upper extremities, in which the psudracious pustules are intermixed with transparent vesicles resembling the pustules in size and form." In fact, their varieties of *I. figurata* and *I. sparsa* may be best regarded as varieties of eczema.

Another disease correctly associated with eczema is *pityriasis*. During the subsidence of vesicular eczema the skin often presents a dry reddened appearance, covered with minute scales; this is essentially pityriasis. Sometimes the scales become thicker and with more cracks, resembling psoriasis, or the scales may be less apparent, and the cracks more distinct, *eczema rimosum*. Pityriasis is defined as "irregular patches of thin bran-like scales, which repeatedly exfoliate and recur, but which never form crusts, nor are accompanied with excoriations. It is not contagious." Pityriasis versicolor is a parasitic form of disease, as we have already mentioned, and a form of pityriasis of the scalp is also probably of the same kind, for spores may be detected upon the epithelial scales, as are seen in *P. versicolor*. Ordinary pityriasis of the head is produced by irritation of a degree insufficient to produce the vesicles of eczema or the pustules of impetigo.

One very interesting case of general pityriasis came amongst the out-patients—*Pity. rubra*. A man, between 40 and 50 years of age, complained of severe itching of the skin, and the profuse formation of minute branny scales, the whole skin was reddened, not in points but uniformly. The scales were so abundant, that the man said that he was quite ashamed "to find the branny condition of his bed; there were no vesicles, but the skin everywhere dry and free from perspiration; on rubbing the hand over the dry skin an immense number of branny scales were removed. The man was dejected, but his health was not seriously impaired. This patient completely recovered.

Another form of pityriasis is represented in persons of

advanced life, by minute points of dry exfoliation, or, as described by the late Dr. Addison, as dry eczema—broken vesicles which had never contained serum.

The pityriasis of the scalp is cured by simple ablution, and by the avoidance of fresh irritation; saline washes, however, facilitate the cure. The other forms require the treatment of eczema—it being remembered that we do not place pityriasis versicolor in this category.

Closely connected with the same class of constitutional affections are the scaly forms of disease *lepra* and *psoriasis*. These are probably varieties of the same complaint. The former is defined by Willan and Bateman as consisting of “circular patches of smooth, laminated scales, surrounded by a reddish and prominent circle. The patches are of different sizes, and depressed in the centre.” “The parts which it chiefly attacks are below the patella, over the tibia, the elbows, the forearms, and the surface, in particular, of the ulna.” *L. vulgaris*, *L. alphoides*, and *L. nigricans* are described. The defined form, elevated and inflamed border, are said to be absent in psoriasis, the surface under the scales is more tender and irritable, the skin is often divided by deep fissures, and the itching is more severe. Willan and Bateman describe *P. guttata*, *P. diffusa*, *P. gyrata*, *P. inveterata*, and *P. localis*.

Eczema is occasionally associated with *lepra*, and psoriasis often nearly approaches in its character to eczema.

The correct pathology and causation of these diseases are obscure; thirty-eight cases appeared amongst five hundred, some of them of chronic form. One had lasted forty-three years. In some, struma existed, in others rheumatism; in several instances it had followed eczema, and fright or nervous shock had immediately preceded its appearance in another. In the diagnosis of *lepra* and *psoriasis* there are several conditions liable to be mistaken, and the first is the form of erythema produced on the hands by *tinea decalvans*. The palm of the hand is sometimes thus affected, and the nails; there is some scaliness of the skin, with itching, and it may easily be regarded as a mild form of *psoriasis palmaris*. Again, in some forms of *lupus non-exedens*, there is a covering of white scales, closely resembling those of *lepra*, but when these are removed, the pitting of the skin beneath is found to

indicate the degenerative character of the disease. Several cases of this kind we have observed at the lower part of the forehead and at the bridge of the nose ; one was on the wrists, and another upon the shoulders ; the last, from the deep colour of the scales, simulated *lepra nigricans*.

In the treatment of these varieties of cutaneous disease the internal is the more important. In some chronic cases I have seen the tar ointment or creasote ointment of service, and where the skin is irritable and inflamed, the oxide of zinc dusted upon the part, or a lotion of diacetate of lead, or ointment of zinc and lead. Glycerine is sometimes palliative. The majority of cases of *lepra* and *psoriasis* are greatly benefited by the preparations of arsenic, commenced in small doses, and steadily persevered in for several months. When the skin is irritable, and in some leuco-phlegmatic subjects, the solutions of potash are of greater service. Where there is a state of general weakness the dilute mineral acids, especially the sulphuric, are more effective than either arsenic or alkalies. Again, we have observed some instances where arsenic not only disagreed with the patient, but the skin disease became aggravated, and in which the use of very small quantities of the solution of the potash-tartrate of antimony was followed by subsidence of disease and slow recovery.

A *third* class of *constitutional maladies* also in close association with the former, are *strumous diseases of the skin*. It modifies those just described, and many instances of secondary syphilis are rendered more obstinate by strumous diathesis ; several cases of syphilitic tubercle, lately treated amongst the out-patients, showed this fact very clearly. The cases that have presented themselves as out-patient give a very inadequate idea of the frequency of strumous disease. The general symptoms are swelling, either partially diffused or irregular and tubercular, redness, and subsequent absorption or degeneration of the low organized product which had been effused. There is generally very little pain or itching or distress, and after the disease has been cured, the skin presents irregular depression from the atrophy or puckering from the healed ulcer. In the *erythematous* variety of strumous disease the part becomes red and swollen, and as the disease slowly extends there is some atrophy of the skin first affected ; thus,

in strumous disease of the mucous membrane of the nose, the upper lip may become thickened, swollen, and erythematous, or the side of the nose, but without the tubercular infiltration observed in lupus non-exedens. We have especially seen the *furunculoid* form in young children. The skin in several parts of the body becomes swollen, and the hardness slowly increases without redness, till the size of a child's marble or even a pigeon's egg is attained; the centre then slowly softens, and at length pus is found in it: slow absorption may take place, or the surface reddens and the pus is discharged, leaving an inactive ulcer beneath. A child, aged 1 year and 10 months, had nearly a dozen of these strumous infiltrations, some small, firm, and painless, others suppurating and nearly through the skin; they had existed about three months. Another was a child, aged 8 years, with strumous disease of the spine. We may mention that, as a rule, it is better *not* to open these small strumous abscesses as soon as pus is present, but rather by generous diet and pure air to improve the general health.

Lupus exedens and *non-exedens* are regarded as strumous disease; no case of lupus exedens has appeared among our patients during the year; but several cases of non-exedens have presented themselves. The symptoms were well marked, namely, irregular thickening of the skin, generally at the alæ of the nose, or at the circumference of the diseased part, partial redness, slight scaliness, and slow degeneration of the effused product producing atrophy or ulceration. In these instances the mischief extended to the cheek, nose, and forehead, &c., and left irregular puckering or pitting in the part first affected. All were chronic cases, one in a woman aged 39, in whom the disease had existed for nineteen years. The mother and several of the brothers and sisters had died from phthisis. A man, aged 40, had had thickening of the skin of the face since childhood, there were cicatrices on the chin, and eczema also existed. Another man, æt. 41, had had lupus non-exedens on the face for twelve years, he had at the same time eczema on the ears.

In the treatment of several of these patients, where no syphilitic taint existed, cod-liver oil, with iodide of arsenic, appeared to do good slowly. To some glycerine was a grateful

application, externally ; with others, the powdered oxide of zinc, or the ointments of zinc and lead, with or without the addition of nitric oxide of mercury was used. Where syphilis was also present—and in some the syphilis had been contracted many years previously—I found greater benefit from small doses of the bichloride of mercury, or dilute nitric acid with decoction of bark or with quinine.

One patient, a young woman, presented a well-marked instance of strumous acne, that is, acne in which inflammatory effusion takes place at the sebaceous follicle, and as the disease ceases, an irregular depression marks the site of the follicle. The face had an irregular tubercular appearance, and the sebaceous follicles had inflammatory redness around them. This form of disease is intractable, but less disfiguring than lupus non-exedens.

A very important class of cutaneous disease are those which are designated EXANTHEMS, and this term may be used not only to include red patches on the skin, slightly raised, which disappear when pressed, and as they subside desquamate in a greater or less degree, as ordinary rose rash, &c., but also, as employed by Cullen, to designate a group of diseases of a contagious kind, beginning with fever, and followed by a specific eruption, running a definite course, and occurring once during life, as smallpox, measles, scarlet fever, &c. In all these acute blood changes take place, and the condition of the skin is expressive of a general state ; the appearance of the skin is of secondary importance, and is carefully watched as indicating the stage of the disease. The rashes produced by poisons may be conveniently placed among the exanthems ; but it is doubtful whether with equal truth we can place herpes in the same group ; it would seem to have more to do with nervous supply than with the state of the blood ; equally doubtful are we as to other diseases, not seen in England, pellagra and frambæsia. In the first division of exanthems we have the *contagious* diseases, variola, vaccinia, varicella, rubeola, scarlet, typhus, and typhoid fevers, and erysipelas. Very few patients affected with these maladies apply as out-patients,—amongst 500 instances, one of modified smallpox, three of varicella, three during the desquamation of scarlet fever, one for inflammation of the arm after vaccination, and three of

erysipelas. As to the *non-contagious exanthems*, there are roseola, urticaria, and erythema, and perhaps we might place herpes, pellagra, and frambæsia. Although only three cases of rose rash appeared amongst 500 patients, it is really a very common disease, and in young children is often mistaken for measles. The rash appears with scarcely any premonitory symptoms, and although there may be slight redness about the eyes and sore throat, the catarrhal symptoms could never be confounded with those of measles, and the irritation of both bronchial and intestinal mucous membrane are never present except as mere coincidents. Ten instances of nettle-rash, one from eating pork, and ten cases of erythema, affecting various parts of the body, were observed.

Some of the instances of herpes were very interesting; eighteen occurred out of 500 patients, and nine were cases of herpes zoster. Of these latter the youngest patient was a child aged 3 years, in whom clusters of vesicles appeared in the course of the fifth and sixth ribs on the left side, and the eldest was 58; in the latter also the disease was on the left side, in the course of the last dorsal nerve; he was also affected with lepra vulgaris. A little girl, aged 8, suffered from crops of herpetic vesicles on the right side of the face, and they were said to come out on the cutting of every tooth; in another case the disease followed the course of the genito-crural nerve; again, another patient had the disease in the course of the descending branches of the cervical plexus.

The pain of herpes zoster is often very severe, and we have known in private practice a patient unwisely salivated and his health thereby impaired for several months; in another private patient affected with herpes zoster, in the course of the last dorsal, the severe pain in the testicle led to the supposition of renal calculus before the true character of the complaint was manifest. Severe neuralgic pain sometimes follows the disappearance of the vesicles, and may continue for two or three months. The use of quinine and steel serve to shorten the attacks of severe neuralgic pain, but opium, chloroform, belladonna, &c., may also be required. I tried the use of aconite, externally, without any benefit. During the formation and height of the vesicular growth it is well to apply some un-irritating dusting powder, as oxide of zinc, or the zinc oint-

ment; and if there be any febrile heat, to give effervescing salines, or the dilute sulphuric acid with sulphate of magnesia.

The *exanthems from poisons* may be considered as arising from mineral substances, vegetable irritants, animal poisons; amongst *minerals* a vesicular rash resembling eczema has been attributed to mercury, arsenic has caused erythematous rash on the fingers, and also lichenous, vesicular, and pustular conditions; the internal use of iodide of potassium is also often followed by a lichenous rash; as to exanthems from *vegetable* substances, the oleo-resins, turpentine, copaiba, &c., have frequently produced a roseolous rash resembling measles; and lastly, the pustules which are frequently found upon the skin in pyæmia may be very justly placed in the same class as smallpox, *an exanthems from animal poison*. Another form of animal poisoning is that arising from the horse, and resulting in *glanders*. A very interesting case of this kind was under my care in the clinical wards of Guy's, and is fully recorded in the 'Medical Times and Gazette.' The man at first presented symptoms of broncho-pulmonia, soon afterwards local inflammation and suppuration about the foot took place, and numerous pustules appeared on the body; about three days before death a sanious discharge from the nose, as in glanders, took place. On inquiry it was found that a short time before his illness commenced, he had driven a horse which soon after died from glanders.

Malignant pustule is also produced by a poison derived from animals, and an instance occurred in January, possibly of this kind. The patient was an intemperate man, aged 58, a trunk-maker by trade. He had had for ten days a circumscribed patch on the left cheek, about the size of a florin, with raised thickened margin, and depressed sloughy centre; it had the appearance of epithelioma, and was almost painless. The extremity of the nose was covered with a superficial slough having an erythematous margin. The man was rather stout and ill-conditioned, but he did not complain of any morbid symptom. The nose resembled a frostbite, and got well with simple linseed poultice. Mr. Cock kindly took him into the hospital at my request, and after a week's stay in the hospital he applied chloride of zinc to the diseased cheek. The slough separated nicely, and the sore soon healed; the man left well.

This disease began as a small spot on the cheek, but it did not run the ordinary course of malignant pustule. It, however, bore a greater resemblance to it than to epithelioma, and the disease was attributed to some foul skin that he had used in his trade.

Another class of cutaneous disease may be designated **CACHECTIC RASHES**. They are expressive of some defect in general nutrition, as in rupia, ecthyma, and pemphigus, so also in furunculus, carbuncle, and leprosy; or the cachexia may arise from some chronic defect in the composition of the blood, as in scurvy and many forms of purpura; whilst other cachectic rashes may be referred to the state of the nerve of organic life, and its connection with the cerebro-spinal system, as in the melasma supra-renal of Addison, and in some cases of prurigo senilis. Willan and Bateman define *Rupia* as "an eruption of flat distinct vesicles, with the base slightly inflamed; containing a sanious fluid, scabs accumulating, sometimes in a conical form; easily rubbed off, and soon reproduced." They give as species, *R. simplex*, *prominens*, and *escharotica*; but also say that, "for practical purposes, it might have been included with the ecthymata, as it occurs under similar circumstances with the ecthyma luridum, and cachecticum." Ecthyma is defined as "an eruption of large phlyctenoid pustules; each seated on a hard, elevated, red base, and terminating in a thick, hard, greenish, or dark-coloured scab. They are distinct, sparingly scattered, and not contagious." Both rupia and ecthyma occurred in cachexia, and both are found in an acute and chronic form. They require nourishing diet, tonic remedies, cod-liver oil, quinine, steel, ammonia, &c., and beyond soothing, unirritating applications to the blebs or pustules, the skin itself may be almost disregarded. With one exception, out of seven cases of ecthyma, all occurred in children or young persons, one after scarlet fever, another after whooping cough, the others ill-fed and badly nourished; the same may be said of ten cases of rupia: one had had measles, another had abscess in the groin, another strumous child had suffered from scabies.

Pemphigus and *pompholix* are also essentially cachectic. Pemphigus has been defined as "an eruption of transparent vesicles, about the size of a filbert, with a red, inflamed edge,

but without surrounding blush or tumefaction, containing a pellucid fluid; on breaking disposed to ulcerate; and pompholix, as an eruption of bullæ or blebs, without any inflammation around them, and without fever, breaking and healing without scale or crust." Three species of pompholix are described, *P. benignus*, *diutinus*, and *solitarius*." Some instances of *P. diutinus* are disposed to ulcerate, and it is unnecessary to retain both terms; in this I quite agree with Dr. Hillier in his excellent work on skin diseases. Of two instances of this disease one was in an infant, aged 7 months, who had had blebs upon it for three months. The other was an interesting case of *P. diutinus* in a man aged 54. He had had gout, and for three months had suffered from crops of vesicles upon both legs; at first the size of a pea, they soon attained the size of a pigeon's egg; after a few days slight ulceration took place, and the part slowly healed. There was no inflammation around the bleb; their contents were alkaline. Several times the blebs would almost disappear, and then four or five minute blebs would manifest themselves. There was no evidence of organic disease of the viscera, the urine was free from both albumen and sugar. I took him into the hospital, under my own care, and he had there a mild attack of gout, but it had very little apparent influence upon the state of the legs. \mathfrak{mij} of *Liq. arsenicalis* were given, but at once produced vomiting and could not be taken at all; other remedies were tried with partial benefit; the arseniate of iron was then given in the form of a pill, with excellent effect, and he left the hospital well.

Eight instances of *furunculus* were noted amongst 500 patients; these also were in cachectic patients, and in one instance, in a woman aged 39, the boils had lasted for nine months.

Purpura and scurvy are universally recognised as being due to some defect in the state of the blood; scurvy has been attributed to the want of fresh vegetables in the diet; and purpura is frequently connected with organic changes in the liver and spleen. An instance of purpura with vitiligoidea has already been mentioned; other cases were:—A woman, aged 32, who for several days had had purpurous spots on the extremities, no internal hæmorrhage, nor severe symptoms; a

cachectic child, aged 2 years. A young woman, aged 28, from Woolwich, was very ill; numerous large purpurous spots existed over the body; she was pale, anæmic, but had no internal hæmorrhage, although a year previously she had vomited blood; like the former case there had been no lack of vegetables in her diet. This case could not be watched as an out-patient.

A very interesting form of purpura is that arising from congenital peculiarity:—Four or five years ago a poor mother brought her child, then aged 2 years, affected with this form of disease. The least blow upon the limbs produced effusions of blood, and a purpurous spot was the result, which soon resembled a large bruise; any puncture of the skin was followed by uncontrollable hæmorrhage; the gums very readily bled. The child was fairly nourished and took ordinary diet well; cod-liver oil, steel, wine, &c., were given; the child was taken into the country, and its health improved. It was repeatedly brought to the hospital during the next three years with the same kind of attack, which partially yielded to treatment; the teeth decayed as soon as they were through the gums, and the remains of them were dark in colour. During the last winter the child was again brought to me, but in a dying state, and the mother could not be persuaded to allow it to come into the hospital: it was as well-grown as children of its age, very anæmic, but with several purpurous spots, or rather vibices, upon the body; food was almost refused; the head was large, and the child was in a drowsy, semi-comatose state; it was extremely prostrate and evidently sinking. It was doubtful whether the state of the brain arose from the condition of the blood, or from purpurous effusion into the brain itself; there had been no convulsion. The poor mother afterwards came in great distress, because a medical practitioner, who had been called in to see the child, not recognising the nature of the malady, said there must be a coroner's inquest; the purpurous vibices upon the body being mistaken for the bruises of ill treatment.

In some instances a stinging pain precedes the effusion of blood, as if there were some alteration in the nervous supply to the part. In 1862, Mary S—, aged 45, was admitted under my care into Guy's in April. She was a poor widow who had suffered much mental anxiety. In the December

previous, she had pain across the abdomen, with vomiting, and in a short time jaundice came on. She was partially relieved, but remained weak and prostrate; seven weeks before admission she had pain at the stomach and in the back. She was emaciated, and slightly jaundiced; the thoracic viscera were healthy, but the heart was feeble. The liver was considerably enlarged, reaching nearly to the crest of the ilium; the abdomen generally was contracted, severe pain at the stomach was brought on by solid food, which was sometimes rejected; the tongue was slightly furred; motions pale, the urine deep in colour. The symptoms greatly diminished under the use of nitro-hydrochloric acid, and afterwards of podophyllum. On May 24th the symptoms of purpura hæmorrhagica suddenly came on; namely, bleeding from the tongue and gums, and the formation of petechiæ and vibices on the arms and legs; the patient stated that the bruises on the arm, &c., were preceded by a stinging pain, and that she could watch the effusion taking place, the red purpurous spot increasing in size as she watched it. There was semi-coagulated blood along the gums, on the tongue, and she had spat up about a pint and a half of blood; the pulse was sharp and irritable; bowels open; no blood in the evacuation, nor in the urine; no headache. She had previously been taking vegetables with her meat diet. Under the use of stimulants, with free doses of quinine and steel, she slowly recovered, and left the hospital in July.

Melasma.—There are several forms of ephelis which arise from exposure to the sun or to the fire, discoloration from pigmental change on the face, the shin, &c.; but other pigmental change is intimately associated with the cachexia of exhaustion, and is connected with the vaso-motor nerve. It may be noticed in the transient discoloration of the forehead, often produced by the exhaustion of hyperlactation, and in its more general form in the discoloration associated with disease of the supra-renal capsule—Addison's disease.

Some kinds of *prurigo* are indicative of a general cachectic state, and others are found with disordered hepatic secretion; others again are dependent on the condition of the nervous system.

Prurigo is defined by Willan and Bateman as "severe itching, increased by sudden exposure to heat, affecting either

the whole surface of the skin, or a part only : in some instances without any apparent eruption ; in others, accompanied with an eruption of papulæ, nearly of the same colour with the adjoining cuticle." They give four species—*P. mitis*, *formicans*, *senilis*, *sine papulis*.

There can be no doubt that a large number of instances of *porrigo* are produced by the irritation of *pediculi* : they have been already referred to ; others, however, arise from very different causes. It is a common symptom of commencing jaundice to have severe itching of the skin, and in many cases of organic disease of the liver with jaundice, the intolerable *pruritus* is the most distressing symptom of disease. After the subsidence of severe disease, and during the course of *cirrhosis* also, *prurigo*, with or without the presence of papules, frequently calls for professional help. Several instances of *prurigo* that have recently presented themselves amongst the out-patients of Guy's have been cases of *prurigo senilis* ; no source of irritation could be detected, and in some no papules existed. They were due to a state of *hyperæsthesia*, connected with failing nutritive power. Mineral acids afforded some relief, but in some no medicament appeared to be of any benefit. The forms of local *prurigo*, except when produced by *pediculi* or connected with *eczema*, are frequently without papules, and are evidently connected with the nervous supply. Still, in some of these, local treatment gives relief ; dilute diacetate of lead lotion, the oxide of zinc with dilute hydrocyanic acid, and in some the application of solution of alum or of nitrate of silver, have been followed by relief.

SYPHILITIC ERUPTIONS constitute a natural division of cutaneous diseases, and they are of frequent occurrence amongst hospital out-patients. Forty-six occurred from 500 cases ; 13 of congenital syphilis some with *rupia* ; 6 of syphilitic lichen and erythema ; 17 of psoriasis and *lepra* ; 7 of tubercle ; 1 of condylomata ; 2 of chronic ulcer of the nose simulating *lupus* ; several of the instances of tubercular disease also presented fibroid disease of the tongue, and others were greatly aggravated by the presence of strumous diathesis.

CANCEROUS diseases of the skin are equally distinctive, whether epithelioma, cancrioid, scirrhus, melanosis. The only instance that occurred amongst the medical out-patients was

the one before referred to, as of questionable epithelioma or malignant pustule.

Of CONGENITAL DISEASES, two instances of ichthyosis were noticed; one in a child aged two years and three months, the other aged eleven years; in the latter case, four of the same family were similarly affected.

The diagnosis of cutaneous disease is often rendered more complex and obscure by the presence of several maladies in the same subject; a strumous child may be affected with eczema as well as tinea—a mere coincidence, which may greatly obscure diagnosis. Scabies may also complicate other forms of disease; so also syphilis. The acute exanthems may be engrafted upon chronic ailments, and local changes be found with others of far greater importance. These circumstances must be borne in mind in the examination of skin disease, and the descriptions and definitions in established treatises are thus found to be at variance with clinical facts.

The most frequent *causes* of cutaneous disease are the want of proper cleanliness, of proper food and clothing, and the application of irritating substances. The greatest ignorance prevails as to the proper diet of children, and instead of milk and farinaceous diet, the answer will often be given, as to the food of a child twelve or fifteen months of age,—“I give it what I have myself,” including meat, beer, &c.; and in attempting to maintain cleanliness, “the best yellow soap” is found to dissolve the skin, and produce severe eczematous eruptions in young children, just as in older persons the free use of soda in washing will dissolve the cuticle of the hands and cause disease.

The irritating applications connected with many forms of mechanical work excite cutaneous disease, and instances of this kind continually occur. Other causes, however, combined with those already mentioned, and impaired nutrition, are often added to constitutional defect; and further, cutaneous disease is very frequently only the sign of a general one. It is difficult to follow the causation of some of these diseases when we are informed that they arise from mental shock; some, indeed, may be referred to an altered nervous supply, but this connection can scarcely be traced in eczema and psoriasis.

Prevention is always better than cure, and the greater pro-

portion of cutaneous disease may really be warded off by attention to proper hygienic rules; and when disease has been induced, it is not sufficient to direct the remedy, for in order that it may be of service it must be used with attention, care, and perseverance; to persevere is often also to complete the cure. It may be that local treatment will suffice, or the appearance of the skin may be disregarded, and the general state only may demand attention; or again, both local and general treatment may be essential. In scabies, sulphur ointment may be all that is necessary to destroy the *acarus* and remedy the malady; in the acute exanthems, as measles, the rash may be disregarded, whilst in eczema the local applications may mitigate the distressing symptoms, whilst the internal remedies remove or change general defect. Each case must be regarded alone, not only in its distinctive character, but in its constitutional history.

THE
VENTILATION AND WARMING OF THE
NEW WARDS, HUNT'S HOUSE,
GUY'S HOSPITAL.

BY JOHN CHARLES STEELE, M.D.

THIS building was erected thirteen years since, to realise the wishes of the late Thomas Hunt, of Petersham, whose munificent benefaction to the hospital it was the desire of the Governors to perpetuate by association with his name. In the structural arrangements several novel principles were introduced with a view to effect a better system of ventilation and warming than is ordinarily obtained in hospitals for the sick; and as the authorities contemplate the completion of the building at an early period, it is desirable that the experience afforded of the working of the system should be fully and fairly reported on. The sanitary principles involved have given rise to much criticism and comment, generally of an unfavorable character, but it is due to the engineer who planned them to state that no circumstantial account comprising accurate details of the working of the system has yet been produced of a reliable character. The arrangements, indeed, are difficult to understand without the aid of illustrative drawings; and to render this explanation more clear, I have availed myself of the permission to use some of Mr. Rosser's plans for the purposes of illustration.

The hospital, as designed by Mr. Rhode Hawkins, was intended to consist of a large central staircase, with wings on

either side arranged in a rectilinear form. The south wing and staircase have been in use hitherto, and it is now contemplated to finish the building by the addition of the north wing. The main entrance to the hospital is flanked on each side by a square tower rising 115 feet from the ground, surmounted with an octagonal turret, and intended for the introduction of fresh air to every floor of the building. To the rear, and abutting on the back of the staircase, there is another tower, of loftier elevation (200 feet), surmounted by an octagonal lantern and a spire of open iron work. This is the main extraction shaft of the building, and is intended for the double purpose of removing the foul air from the wards and waiting rooms, and the waste heat and smoke from the fireplaces and furnaces. There are five separate floors opening directly from the staircase, and the accommodation on the ground-floor is supplemented by a projection extending round the front and rear of the edifice, and which is used in connection with the dispensary and out-patient departments. The ground floor is reserved especially for the weekly reception of in-patients and daily examination of out-patients, and comprises on one side a spacious central hall, with two large waiting-rooms to the right and left on entrance, appropriated respectively for medical and surgical cases. On the other side, and separated from the waiting-rooms by the spinal wall which traverses the building lengthways, are seven other apartments, including the dispensary, laboratory, and rooms for special examination. The basement projection provides accommodation for medical officers, baths, water-closets, and surgery; and is entirely independent of the system of ventilation which exists elsewhere. To avoid any inconvenience to the internal administration, separate entrances to the street have been provided, and communication with the rest of the hospital is almost entirely cut off during the period of consultation. The entire arrangements are found from experience to be admirably adapted for the purposes intended. The first, second, and third floors, which are alone devoted to the treatment of in-patients, are alike in every principle of construction, with an exception in the comparative number of air-channels that respectively lead to and from them. Each floor forms of itself a large ward, with a day- or dining-room in the centre, and is intersected by

the spinal wall, which thus subdivides the ward into four distinct compartments, communicating with each other, and containing from twelve to thirteen beds each, the entire ward accommodating fifty patients. The compartments are 69 feet long, 14 feet high, and 20 feet wide, and the beds are placed so that on one side they are individually made to correspond with the piers betwixt the windows. Contiguous to the central day-room are the bath-room, lavatory, and ward-scully on one side, and the rooms of the superintending nurse, or sister, on the other. The total cubic contents of a ward, including day-room and communicating passages, amounts to 103,740 feet, and excluding the latter, to 85,204 feet. Deducting 6 cubic feet as a fair average allowance of space for bedding and ward furniture, the individual space allotted to each patient will therefore be 2069; or, according to the latter calculation, 1698 feet. The former estimate is the more correct of the two, as the atmosphere passes readily from one compartment to another, and all communicate freely with the central room. The upper, or fifth floor, is reserved as a dormitory, and is conveniently arranged to accommodate forty nurses.

The building is substantially built of brick, with stone facings, and the basement projection, which is faced with rough sandstone, is surmounted with an elegant balustrade, enclosing a terraced walk extending along both sides of the hospital. The walls are 2 feet thick, rendered inside, and finished with parian cement. In the construction of the floors, iron girders and iron joists, imbedded in concrete, have been employed instead of wood, which has been used as sparingly as possible throughout the building. The spacious staircase, which contributes materially to the ventilation, is constructed solely of iron and Craigleith stone. The entire cost of construction amounted to £33,846, of which sum £3155 was charged to the ventilating and heating apparatus.

The ventilating and warming of the hospital were entrusted to the late John Sylvester, well known for designing and executing similar sanitary projects in connection with public edifices, and after his death, which occurred while the work was being done, it was completed by his partner and successor, Mr. Rosser, who had previously the general superintendence of

the details. As the general construction of the building was made, from the first, subordinate to the engineering requirements, and as every facility was given to carry out the original designs in their entirety, an unusual opportunity was afforded to perfect a system of ventilation and warming that would be found to meet the growing necessities of hospital hygiene without being crippled by architectural or other obstacles. The design which Sylvester adopted appears to have been founded on a combination of the two systems of mechanical and natural ventilation, and to have comprised under the former an active extractive or appellant force, available in summer as well as in winter, and a less energetic means for the supply of fresh air by simply diminishing its density, a process which of course could only be effectually accomplished during the winter months. To realise these objects it was found necessary to make use of the entire space under the ground floor for the purposes of the engineer, as well as to erect the three great towers or air shafts, which give a distinguishing effect to the building. It was originally intended, in winter at all events, that the windows should be kept closed, and that the interior should be indebted only to the adduction channels for its supply of fresh air, but this arrangement was found impracticable shortly after the wards were occupied; and as it has not been insisted on as a necessary part of the system, it would be unfair to regard the circumstance in the light of failure.

Admission of air.—To ensure as pure an atmosphere as the environs of the hospital can afford for ventilation, the air is admitted at a height of 100 feet from the ground, through open spaces in the octagonal turret which surmounts the fresh air shaft, and its admission is encouraged by means of a wind-guard acting inversely, and exposing a concave surface of 22 feet superficies to the wind current. The hollow interior of the downcast shaft measures 13 feet by 8 feet in width, and the air entering descends with a velocity varying in force with the relative differences in external and internal temperature, and is influenced also, though in a less degree, by the atmospheric pressure. That part of the shaft in immediate conjunction with the warm air chamber is furnished with sliding doors, measuring, when opened to their full extent, 9 by 8½ feet, and which are intended to regulate the force of

the descending currents. These open into the intermediate or fresh air chamber, which measures $34\frac{1}{2}$ by $8\frac{1}{2}$ feet; and contiguous to this chamber, and opening freely from it, are two vast galleries extending along the entire basement of the building, and which are intended for the supply of air to the conduits leading to the wards. In the side and centre walls are placed the pipes of the heating apparatus. These, six in number, proceed from a boiler situated outside the fresh air chamber, and after making a double curve subdivide at their entrance to the long galleries into fifteen separate ducts, of which eight are placed in excavations in the side walls for the supply of the ground-floor, which depends solely on this mode of heating, and seven are fixed in similar channels in the central wall for the special service of the wards. These flow-pipes, accompanied by a diminished number of return pipes, accomplish a distance of 400 feet before again reaching the boiler, and expose a heating surface of 300 feet. To render their action more effective the pipes, as may be noticed in the plan, are furnished on their lower half with flanges, exposing a triangular heating surface to the air and placed so contiguously to each other that no air can pass into the vertical upcast channels without first impinging on the surface of the pipes. The air supplied to the fresh air chamber becomes partially heated by conduction before it passes through a series of orifices which lead to the excavated channels in the wall in which the pipes are laid. These channels are in other respects inaccessible, and on that account the arrangement is objectionable, as it prevents facilities for cleaning or of discovering faults in the apparatus. In the wall channel and immediately over the pipes are the entrances to the vertical flues which supply the warm air to the various floors of the building. They are 150 in number, of which 79 permeate the outer walls, and 71 pass upwards through the central wall to the wards. No two flues communicate in any way, so that their terminal openings on the various floors correspond with their respective number. The apertures, protected by an iron grating, are placed within a few inches of the ceiling in the wards, where they each measure 14 by 8 inches, and in the reception rooms on the ground floor they are 3 feet from the ceiling, with a surface measurement each of 24 by 15

inches. They vary in number on the different floors, diminishing numerically as we ascend from the ground floor, where there are sixty-six, to the upper floor, which is furnished only with thirteen.

Extraction of air.—Contrary to ordinary usage in this country, where vitiated air is usually encouraged to find an exit from or near the ceiling, the engineer in the present case has adopted a plan, sanctioned by high authority elsewhere, by which it may be removed within a short distance from the floor, by means of a series of flues distinct from each other, and corresponding in extent and approaching nearly in number the admission air channels. Like those, they are irregular in number on the different floors, and from their frequent position behind the beds and ward furniture, are apt to escape observation. The total number in the building amounts to 132, of which 56 are placed in the ground floor and dormitory, and 76 are distributed throughout the three wards. Their area is uniform in the wards and ground floor, namely, 14 by 8 inches, and they present an active extraction area of superficies, measuring in the respective wards 21 feet 9 inches, 20 feet 3 inches, and 16 feet 11 inches, diminishing in number as we ascend, but increasing in their appelland action. These channels all communicate on the same level with the extensive vitiated air chamber, which extends horizontally from one end of the building to the other, and terminates in the lofty smoke shaft, as depicted in the drawings. Besides its own levity several elements contribute to the evacuation of the impure air, which require separate notice. Through the entire length of the used air chamber is placed the smoke duct, which receives all the smoke from the ward fires. This is a cubical iron channel, increasing in size as it approaches the tall smoke shaft, and occupying two thirds of the area of the vitiated air chamber. The rarefying power produced by the smoke duct is still further promoted by the circulation of hot water through the chamber by means of two 4 inch pipes, which form part of the apparatus intended to supply the bath-rooms and wards with hot water, and for which purpose a high level hot-water cistern is erected near to the air shaft in the upper floor of the building. These arrangements are too minute to be depicted in the plans, but their position can be readily detected. A powerful draught is obtained in the high tower

itself by the waste heat and smoke from the furnaces connected with the hot air and hot-water apparatus which are situated close to its basement.

Experience of the system of warming.—In addition, or rather in combination with the admission of fresh air to the wards, it was intended that the air so admitted should be heated to a sufficiently high temperature to render it pleasant and agreeable to the inmates during the coldest weather that was likely to occur in the course of winter. It is to be remembered also that, in addition to the artificial system of heating, the three floors of the building used as wards were furnished with open fire-places of a construction well adapted for supplying a larger amount of heating power than is customarily obtained from ward stoves. These are placed back to back in the centre wall, one in each of the four compartments of the ward, and are supplemented in the central compartment or day room by an extensive closed range, intended principally for cooking, but which also contributes materially to the supply of heat. It was originally intended that in most weathers the artificial supply of warm air should supersede the necessity of open fire-places, but as this arrangement, after repeated trials, was found impracticable, it was finally abandoned, in consequence of the unanimous wishes of the medical staff. The main objection to its sole employment was a deficiency of heating power during very cold weather; but a stronger objection than this, and one which is applicable to all artificial systems of heating, arose from the want of any controlling element to moderate the continually recurring changes in the external atmosphere—a want that can only be supplied by an intelligent use of the open fire-place. A sudden increase in the temperature outside was generally found to produce that stuffy sensation so familiar to every one accustomed to rooms overheated by artificial means. It is true that the effect might be obviated partially by opening the windows, but this is not always practicable during cold weather, nor could it be kept up continually in a moderately cold atmosphere. In fact, the system of heating by hot air alone interferes most materially with that ready and frequent change of atmosphere which is so indispensable to the healthy condition of the hospital ward, and no substitute has yet been introduced for the open fire-

place which can in any way equal it in efficiency, either as a means of distributing heat or of contributing to the agreeable atmosphere of the ward. As an auxiliary means of warming during very cold weather it cannot be doubted that the warm air introduced by the apparatus has its advantage, and in this light only it has come to be considered in the hospital. It happens, however, that the ground floor of the building used for the reception of three or four hundred out-patients daily has to depend solely for warmth on the working of the apparatus, and as it is impossible to cut off the connection betwixt the floors, or to heat one part without another, the system has to be made permanent during at least six months of the year. On this account it is difficult to discover from the observations made on the temperatures how much is to be attributed to the apparatus and how much to the ward fires. The fact that during cold weather the temperature of the ground floor is ten and sometimes fifteen degrees less than that of the wards, can scarcely be considered an argument in the question, as one half of this department is supplied with air from a source which does not present the same facilities for generating heat as the rest of the apparatus, and the other half is subjected to a repeated influx of cold air from doors opening directly to the external atmosphere. In a series of observations which were made by Mr. Rosser, during the winter of 1857 and 1858, it was noticed that in the cold weather of February and March, when the external temperature was usually below 32° Fahr. the thermometers in the wards never registered less than 56° Fahr., and that only on one occasion, while the maximum reached 67° Fahr., and the average day and night temperature was as high as 61° Fahr. Mr. Rosser attributed this uniformly high temperature during an unusually cold season mainly to the influence of the warming apparatus; but it would be manifestly unjust to deny any share to the effect of the open fires which were in active operation during the time. Since then, in consequence of the close and stuffy condition of the wards, which was the cause of frequent complaints, large ventilating openings were introduced, opening into the wards from the staircase, and louvered panes of glass were placed in every alternate window. These arrangements have contributed much to the control of the general ventilation of the wards,

and improved their sanitary condition, although at the same time they have considerably diminished the standard average temperature during winter. With the view of testing the effect of the general system of warming and ventilation, I have had daily observations taken since the 1st January of the present year, comprising external and internal temperatures, relative humidity, the temperature of the air chamber, and of the adduction and eduction currents in the wards. The following tables give a monthly analysis of these observations during the three most important winter and summer months. The first refers to the condition of the weather.

	Average barometer pressure.	External temperature.		Relative humidity. Sat. = 100	Fresh air chambers. Average temperature.
		Average maximum.	Average minimum.		
January	29.53	41.2	34.3	67	41.8
February	29.48	41.3	33.7	66	42.6
March	29.80	42.4	33.4	63	44.1
June.....	30.19	69.8	55.7	54	Not in operation.
July	29.40	73.5	59.	60	"
August.....	29.72	69.	56.	64	"

The following table represents the condition of the ward atmosphere during the same period. The thermometers from which the observations were taken were placed in the most appropriate position of Stephen Ward, as from its position in the centre or second floor of the building, it was assumed that it would furnish the most correct data.

	Average temperature.		Relative humidity. Sat. = 100.	Adduction currents.		Poul air currents.		Average temperature, old wards.	Humidity, old wards. Sat. = 100
	Average max.	Average min.		Maximum.	Minimum.	Maximum.	Minimum.		
January ...	60	54	70	59	54	56	51	51	70
February ...	59	51	72	58	53	54	49	53	69
March ...	60	56	72	60	55	51	48	52	74
June.....	64	61	...	...	...	69	62	65	50
July	65	66	...	...	...	71	63	66	68
August.....	63	66	...	...	...	68	63	66	66

A better idea of the effect of the system pursued is obtained from the daily record of observation. For this purpose, I have inserted a table comprising the thermometric and other changes, which occurred daily during the month of March, as this month presented several peculiarities worthy of note. Last winter was unusually severe, and although the average temperature in March was higher than in January and February, the cold was felt more intensely in consequence of the character and direction of the wind, which necessitated on several occasions the complete closing of the entrance to the air chamber from the ventilating shaft.

Date.	External Meteorological observations.				Internal Meteorological observations.									
	Barometer.	Temperature.		Relative humidity. Sat. = 100	Temperature.		Relative humidity. Sat. = 100	Warm air currents.		Foul air currents.		Condition of ward.	Old wards Av. temp.	Relative humidity. Sat. = 100
		Max.	Min.		Max.	Min.		Max.	Min.	Max.	Min.			
Mar.	In.													
1	29.56	51	43	57	62	56	71	61	58	54	50	Good	55	70
2	29.66	48	42	67	61	57	76	60	56	57	48	"	56	70
3	30.20	46	35	66	61	56	76	59	55	53	49	"	51	68
4	29.78	48	34	60	60	56	81	60	55	55	44	"	52	64
5	29.55	45	40	66	60	52	70	59	55	54	50	"	53	74
6	29.16	40	35	45	61	53	87	58	55	56	49	Indifferent	55	70
7	29.53	42	34	63	60	55	81	60	56	58	48	Fair	52	80
8	29.60	40	33	57	60	54	81	60	55	57	50	Good	53	69
9	29.81	41	34	70	59	50	80	59	54	56	49	"	51	74
10	29.88	42	33	63	60	52	66	60	52	57	48	Fair	52	74
11	29.55	43	36	76	60	56	65	60	52	56	50	Good	53	74
12	30	42	39	78	60	56	71	60	54	57	50	"	54	74
13	29.88	38	33	63	61	57	76	62	56	58	51	Close	53	80
14	29.79	39	35	83	61	56	71	61	58	56	53	Good	54	74
15	30	43	34	75	62	55	75	62	56	57	57	"	51	86
16	29.97	40	39	78	61	56	76	63	55	59	53	"	51	86
17	29.94	41	34	63	62	56	81	62	58	58	54	"	52	80
18	29.94	40	33	57	61	56	75	60	57	56	54	"	54	80
19	29.64	39	34	63	61	55	65	61	55	53	50	"	53	74
20	29.87	39	30	76	58	52	69	59	53	50	49	Fair	52	80
21	30.03	41	28	73	59	52	74	60	53	50	47	"	50	68
22	30.04	40	30	63	60	53	75	61	54	52	46	Good	53	69
23	29.82	41	32	63	59	54	75	60	56	53	48	"	52	80
24	29.80	40	31	72	69	55	75	59	55	50	49	"	53	74
25	29.83	41	28	47	58	52	70	58	54	49	47	Fair	54	74
26	29.65	40	28	45	57	52	70	59	53	50	44	"	52	80
27	29.94	43	27	—	59	56	65	60	54	51	46	"	53	80
28	30.12	45	29	—	60	54	60	62	56	54	48	"	51	63
29	30.10	42	31	51	61	55	65	61	58	53	47	Good	54	74
30	30.21	44	29	42	61	55	76	62	55	57	40	"	54	64
31	30.04	51	33	49	62	56	71	61	57	56	58	"	55	70

It is a question of much practical difficulty to decide what ought to be the standard temperature of a sick ward during winter. The chief authorities on this subject appear to agree on the desirability of maintaining a temperature of about 60° Fahr. ; but it is barely possible to obtain this in cold weather, and at the same time provide for a renewal of fresh air that would keep the ward free from hospital smell. It is always found that, in proportion to the increase of artificial temperature, organic impurities become more obnoxious, and the necessity for a renewal of the atmosphere becomes urgent, at a time when it would be unsafe to renew it directly by means of open windows. In other words, in cold weather a moderately cold atmosphere is more compatible with a healthy condition of a ward, than one raised by artificial means to 60 or above 60 degrees. In summer weather, organic matter as well as respired air are removed with a facility proportionate to the amount of open window space and the velocity of the atmospheric current, but there can be no doubt that in this building it is obstructed in its progress by means of the divisional wall, notwithstanding the three extensive openings of communication placed in each compartment. It is mainly on this account, aggravated perhaps by a defective manner of opening the windows, that the summer ventilation of these wards is less satisfactory than that of the old wards in Guy's House. With reference to the tables of temperatures it is significant that the heat of the incoming air in the adduction channels was very slight, averaging in fact less than the normal temperature of the ward itself, the difference being made up by the ward fires. On no occasion did the elevation of temperature in the incoming air currents mark higher than 63°, and on two days during the month in question, it reached a minimum of 52°. These figures certainly do not indicate a high degree of heating power from the apparatus, but they denote what was much more beneficial—a better sanitary condition of the ward atmosphere than it was possible to maintain if the admitted air had been heated to a temperature of 64° and upwards. During the past and previous winters the experience of the system of warming has been certainly satisfactory so far, as it has rendered the temperature of the large waiting-rooms on the ground floor comfortable, while during very cold weather it has contributed materially to the warmth

and to a renewal of the atmosphere in the wards. To maintain this condition, however, it has been necessary to diminish the size of the opening through which the cold air has access to the heating chambers, and on several occasions to cut off the connection entirely. Notwithstanding these precautions, the consulting-rooms on the side of the building facing the hospital grounds, and occupying one half of the ground floor, had never their fair proportion of warmth. These rooms are indebted for the small supply that reaches them to hot-water pipes, which have to traverse almost the entire length of the intermediate cold air-chambers depicted in the plan, and get cooled in their passage. From its great distance from the heating source, the upper floor of the building is deprived of similar facilities for obtaining warmth, but as it is only used as a sleeping apartment for the female attendants, its requirements are not felt so urgent. Since Mr. Rosser made his observations on the relative differences in temperature, it would appear that the apparatus has lost much of its heating power. I have long felt convinced of this circumstance from my own sensations, but feel at a loss to ascribe it to any special cause. It is possible, however, that it may be associated in some way with mechanical obstructions in the pipes and adduction channels, since the consumption of fuel has in no way diminished. With the exception of the rooms already referred to, it cannot be said that the diminution in the heating power has been attended with any serious consequence. On the other hand, from the vast extent of the air-chambers, the numerous apertures for distribution, and the window ventilation in the wards, the feeling of closeness inseparable from most buildings heated by hot air is in great measure avoided.

Experience of the ventilation by admission of air.—It was formerly explained how the fresh air from a high level was sought to be introduced by aspiration, through the octagonal turret, furnished with a guard exposing its concave surface to the wind current. It has been noticed how an abundant supply of air is obtained in this way to meet the requirements of the heating apparatus, but as the object of the entire arrangements was to combine the introduction of a free supply of air as well as of warmth to the wards, it is necessary to consider how far

this is accomplished. The system of ventilation by aspiration only is so thoroughly dependent on the influence of the atmospheric current, that it is difficult to see how the proposition could be reasonably entertained during at least six months of the year, when there is no motive power at work to alter the density of the external atmosphere. In its downward passage the air has to traverse a descent of 100 feet before it reaches the base of the shaft; it has then to debouch along subterranean galleries of 200 feet in length, and afterwards to ascend through innumerable crevices and channels, to enter the habitable parts of the building, at levels varying from 12 to 60 feet from the basement. By the disposition of the heating tubes, which nearly close the entrance to the adduction conduits, and which answer their purpose well enough in winter, the air in summer weather is greatly hindered in its progress; and from the absence of any motive power to expedite it except its own velocity, it seldom contrives to make its entrance perceptible in the wards. When, however, the force of the wind current becomes stronger, and indicates a pressure of one pound or upwards on the square foot, the admission of air to the ward situated on the first floor becomes apparent, while the others situated over it do not appear to participate in the change. Again, in high winds the currents are noticed to be more irregularly distributed, the lower floors suffering from occasional gusts, accompanied with particles of soot and dust, while the higher are subjected to the same inconveniences, only in a less degree. These irregularities can of course be corrected, by severing the connection betwixt the descending and ascending currents, but then the system becomes no longer self-acting. The number and surface area of the adduction openings, along with the cubic contents of the several floors, will be best understood by reference to the following table:

	No.	Total superficies in feet of adduc- tion openings.	Internal space cubic feet.
Ground-floor	66	156·33	105,196
First floor	28	21·75	103,740
Second floor	24	18·58	103,740
Third floor	19	14·66	103,740
Fourth floor.....	13	11·50	74,376

The action of the separate flues when assisted by heat is exceedingly eccentric and various, some acting with great energy and uniformity, others with only a perceptible current, while a few, not exceeding twelve altogether, appear to have lost their action entirely. To the waiting-rooms on ground-floor, the warm air ascends readily by the apertures which here represent four and a half times the area of the extraction flues, so long as the temperature of the apartments remains below that of the heated air, which it almost invariably does; but frequent illustrations of a reverse action are observed in other apartments on the same floor which are but indifferently supplied with warm air. One of these rooms forms the pharmaceutical laboratory of the hospital, and it not unfrequently happens that the strong odour from medicines in a state of preparation, augmented by the heat from the steam supply, is carried upwards to the inlet openings, through which it descends, and mingling with the air in the warm air channels, it reascends by other channels into adjoining rooms. The defect is entirely of an exceptional character, and would no doubt be remedied by an increase of the heating power in this part of the building.

With respect to the amount of new air introduced it would be unwise in the absence of any extended series of observations, comprising the action of each separate flue, and the varying conditions in which observations are made, to hazard even a rough calculation. It has been already explained that, during the period of the year when the warming apparatus was not in operation, little or no air was perceived to enter the wards during moderately calm weather, while during winter it entered in consequence of its diminished density. A calculation made from the relative difference betwixt the weight of the external cold air and internal warm air on Montgolfier's formula is evidently so fallacious that it is purposely omitted, the internal temperature of the ward having been for the most part higher than that of the adduction currents. With regard to the expediency of placing the admission air apertures at or near the ceiling, no objection of any weight can be adduced, while it possesses the great merit of preventing either warm or cold currents from being sensibly felt by the patients. This question,

however, bears almost exclusively on the position of the orifices of evacuation.

Experience of ventilation by the extraction of air.—As was formerly noticed, the eduction openings are placed near to the floors, and correspond for the most part in number and superficies to the orifices for admission, excepting on the ground-floor, where they present a superficial surface three fourths less in extent. The following table gives the respective number and dimensions of these orifices on the separate floors.

	Number	Superficies in feet.
Ground-floor . . .	43	= 35.50
First ward . . .	28	= 21.75
Second ward . . .	26	= 20.25
Third ward . . .	22	= 16.90
Fourth floor . . .	13	= 7.17

Although the action of several of these flues has been somewhat irregular, the extracting power of by far the greater number is observed to be constant, in summer as in winter, and whether the windows are open or closed. As might be expected the appellant action increases in proportion to the shortness of the distance betwixt the ward opening and the main suction shaft, and on this account the number of channels has been made to diminish as we approach the upper part of the building. From a series of six separate observations made on the twenty-six extracting flues in the second ward by means of Casella's air meter in the months of July and August last, it was found that the average amount of air passing out by each opening measured 85 cubic feet per minute, which would be equivalent to 2660 cubic feet per hour for each patient, independent of what was passing out by the windows. The observations were purposely made under various conditions and manifested very different results. The maximum amount of extraction noticed in the ward amounted to 3120 feet per minute, during a high wind with open windows, while the minimum measured only 1490 feet per minute, with little or

betwixt the internal and external temperatures, and the additional draught in the chimney; but of this I have not been able to satisfy myself by accurate observation. If the main smoke shaft is to be used in connection with similar arrangements in the wing of the building remaining to be built, as was originally intended, there can be no doubt that the exhausting power on either side will be very materially increased at all seasons. At present, the system affords a continual interchange of air under the most adverse circumstances, and although the amount extracted is below the maximum set down as desirable by the best authorities, it is still very considerable, and might possibly be augmented by improvements in the general arrangement. An important, perhaps the most important question connected with the system, is the position of the orifices of the exit channels. It has been noticed in the table of temperatures that the foul air currents on a level with the floor were usually from three to six degrees lower than the general ward temperature, and the temperature of the incoming warm air. This fact of itself proves that the warm atmosphere is not so perfectly diffused throughout the apartment as the supporters of the system would lead us to infer. With regard to the other objects sought to be attained by placing the extracting orifices near the floor, they also appear more or less objectionable, or, at all events, open to question, when applied to the ventilation of an hospital ward. The main arguments in their favour rest on the expediency of removing the foul air at or near the spot where it is generated, before it has time to mingle with the air of the room, and on its permitting the fresh air to be introduced from a higher stratum than is usually adopted, to diffuse itself universally, and to aid the chimney ventilation. The system appears certainly well adapted for rooms liable to become crowded and overheated by gas, and has latterly achieved a signal success in the new theatres at Paris, where the heat of the gas lustres is utilised to produce a powerful appellant action. But in the wards of hospitals, in which a large amount of space is furnished to each patient, and where a system of ventilation unimpeded by variation in temperature or by the force and direction of the wind current is in use, a ready exit to the foul air by apertures near the ceiling has never been found to act un-

satisfactorily. It is difficult to understand also how the respired air issuing from the lungs at a temperature of 98° Fahr. will not prove more obnoxious, ascending by virtue of its own levity, and afterwards meeting with resistance from the incoming air, by becoming diffused through the apartment before it is removed by the orifices of evacuation. As regards the fresh air currents, their position of entrance and uniformity of action appear of minor importance so long as a good extraction force is in operation. It is a question, indeed, whether under this condition the former are absolutely necessary, as there seems no difficulty in obtaining from the closed windows and doors an amount of new air mostly sufficient to supply the want caused by exhaustion. Engineers and others engaged in estimating the amount of air required by the sick rarely make allowance for those variations of temperature which interfere so materially with all systems of artificial ventilation, but which are not unattended with benefit to the sick themselves. In very cold weather, when it is found necessary to keep windows sedulously closed, we have, notwithstanding every precaution, a considerable supply of new air from chinks and open spaces of doors and windows, a supply proportioned and dependent on the difference between the external and internal temperatures. Such is the only system by which, during exceptionally severe weather, an exchange of air is effected in the old wards of the hospital, and excepting a reduction of temperature to 50° Fah., or thereabouts; the practice is not attended with any serious prejudice to the patients. It appears, however, desirable for hospital purposes, that some ready means of introducing new air at pleasure and directly from without, without causing sensible inconvenience, should be provided, and that it should be made available for all climatic changes that are likely to occur. If the object be to admit fresh air only, its introduction by openings in the walls, on a level with or near the floor, or behind the beds, or a few feet above the beds, will always be found objectionable, in spite of the numerous contrivances in use to diminish the direct force of the cold currents. Though not so palpable, the same objection obtains with respect to the admission of air by gratings in the centre of the floor, which are still more liable than the former to get filled with dust and dirt. These objections have been fully considered

by recent Governmental inquiries in England and France. The authors of the English sanitary report recommend, and have adopted in all recently constructed barracks and hospitals, the plan of admitting air directly from without through valves (Sherringham's) placed about three feet from the ceiling, in the wall space betwixt the windows, and at as convenient a distance from the head of the bed as it is possible to place them. Morin, in recent reports and writings, advocates the system of introducing cold air by orifices in the cornices, and it appears that this system has been pursued with advantage in numerous public edifices abroad, but in such an arrangement it is, of course, necessary to have the apertures of evacuation placed in or near the skirting of the floor. A much more effectual diffusion of the atmosphere, such as is required periodically in every hospital ward, can only be obtained by admitting the external air, in lairs, at different levels, from the ceiling to the floor, or to within a short distance from the floor, by means of windows properly constructed with this object. If a tithe of the ingenuity which has been expended in the construction of gratings, perforated bricks, valves, wire gauze protectors, and other miscellaneous contrivances, had been spent in adapting our ordinary sash window to the numerous requirements of health, we should long ago have been furnished with the best means in all weathers of securing a ready and efficient method of renewing the ward atmosphere. All the substitutes referred to are liable to get choked up with dirt. Many of them require to be worked with cords, which are both unsightly and inconvenient, and all require more or less skill and care in adjustment, while during six months of the year they are comparatively useless, as recourse must necessarily be had at that time to open windows. In all well constructed hospitals, windows are placed on both sides of the wards, and are so intercalated with the beds that direct currents on the patients are for the most part avoided; still considerable inconvenience is caused during cold weather, and in warm weather with a moderate wind, where windows constructed on the ordinary sash or guillotine principle are employed to admit the air. The same objection applies to the French *croisèe* window, which is even worse adapted than the English for this purpose, and it is possibly on this account

that so much more has been done in French than in English hospitals to devise new methods for the introduction of fresh air. One plan of remedying the inconvenience of the direct current, in use in many establishments, consists of a board fixed horizontally to the upper part of the upper window-sash, and which is made to slope at an angle when the window is opened, so that the incoming air is directed towards the ceiling before it diffuses itself. This arrangement, though useful at all times in winter, is clumsy, and it provides only for the admission of one stratum of air at a high level, which is too little for summer ventilation. An improvement on the last system is furnished by making the upper sash of the window move diagonally, the upper part inwards, the lower part outwards, and controlling its action by means of a pivot rod. To ensure a more perfect action from windows constructed in this manner, it has been found useful in the old wards at Guy's to detach two of the upper panes in each sash from the framework, and to make them slope slightly inwards, in order to leave an open space of a hoppermouth form, twenty by four inches in extent, always open. But a better arrangement than either of these could, no doubt, be devised, by dividing the window into three or more divisions, made to open diagonally by a central connecting rod, with a rack and pinion adjustment fixed to the sill. Windows of this construction have long been in use in the Middlesex Hospital, and are said to answer their purpose satisfactorily in all weathers. It would be an improvement, however, to be able at certain periods to close and open the separate divisions at pleasure, and also to provide for a closer adjustment of the edges of the partitions during very severe weather. With good fires, and a sufficiently powerful extracting force, irrespective of the chimneys, a very minute opening of windows constructed in this manner would supply an abundant ventilation, always under control, to meet thermometric and special local requirements, while the proper province of the window to admit light and air need not be interfered with by the numerous contrivances that are so frequently patented to usurp this function, and which are found by experience to do it very inefficiently.

Cost of the system of warming and ventilation.—To keep the apparatus in active operation requires a considerable ex-

penditure of fuel, which, among other matters bearing on the question, requires separate consideration. The following tabular statement represents the consumption of fuel during the last financial year :

<i>Winter Months.</i>			Tons.	cwt.
Hot-air, or warming apparatus	.	.	45	10
Hot-water and extraction boiler	.	.	31	4
Ward fires	.	.	81	0
			<hr/> 157	<hr/> 14
<i>Summer Months.</i>				
Hot-water and extraction boiler	.	.	23	8
Ward fires	.	.	40	2
			<hr/> 63	<hr/> 10
<i>Total for the Year.</i>				
Hot-air or warming apparatus	.	.	45	10
Hot-water and extraction apparatus	.	.	54	12
Ward fires	.	.	121	2
			<hr/> 221	<hr/> 4

Reckoning the value of a ton of coal at twenty shillings, which is about the average contract price in London, the expense per annum for each bed would amount to twenty-nine shillings and fivepence; but as this calculation includes the cost of heating water and air used for other purposes, it is scarcely a just estimate. By deducting one third of the expense of the hot-air apparatus for a supply to the ground floor, and one half of the cost of the hot-water supply for the use of the baths, the calculation would give us twenty-two shillings and sixpence per annum per bed. Comparing this with the analogous consumption in the old hospital, during the past year, we find that for 425 beds the consumption of fuel amounted to 491 tons, or twenty-three shillings and a penny per bed. The trifling economical advantage is therefore in favour of the former system; but against this, again, we have to place the original cost of the works, occasional repairs, and the partial employment of a man to stoke the furnaces. With respect to the proportion in which each agent in the

double system contributes to the warming, it is difficult to arrive at any correct result. The temperature of the ground floor is certainly less by several degrees than that of the wards, but this circumstance has been partially accounted for by the cooling of the conduits which supply this floor in their passage through the fresh-air chamber. On Sundays the employment of the hot-air apparatus is suspended without any diminution to the ward temperature, but it is only fair to assume that a large amount of heat is absorbed and retained for many hours by the brickwork of the numerous flues in the centre wall, which may partly account for this remarkable result.

Recapitulation.—On reviewing these observations, I think I am justified in arriving at the following inferences :

1st. That the heating apparatus in conjunction with the ward fires provides for an agreeable temperature in the wards during severe winter weather.

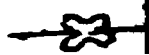
2nd. That during very cold weather the heating power is unequal to the requirements of the ground floor and dormitories.

3rd. That as a means of ventilation by the admission of air the apparatus contributes materially during winter, but it does not obviate the necessity of daily recourse being had for a fresh supply of air from open windows.

4th. That as a means of ventilation by the admission of air during summer, the apparatus is valueless.

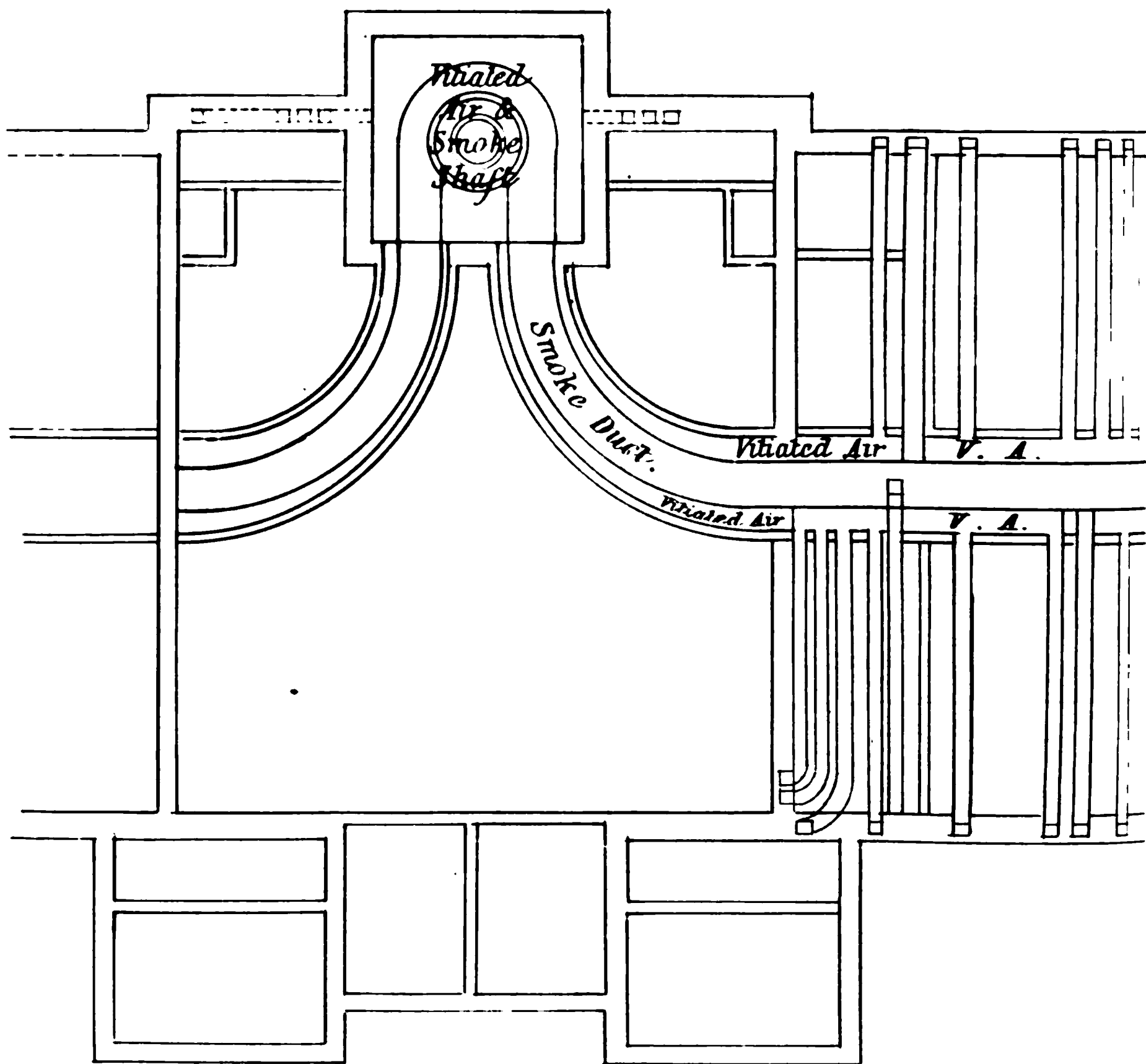
5th. That as a means of ventilation by the extraction of air, the system works energetically at all seasons of the year, irrespective of atmospheric variations.

6th. That the current cost of providing fuel for the apparatus is not greater than is required for other methods of hospital warming, and is small in comparison with the advantages obtained.

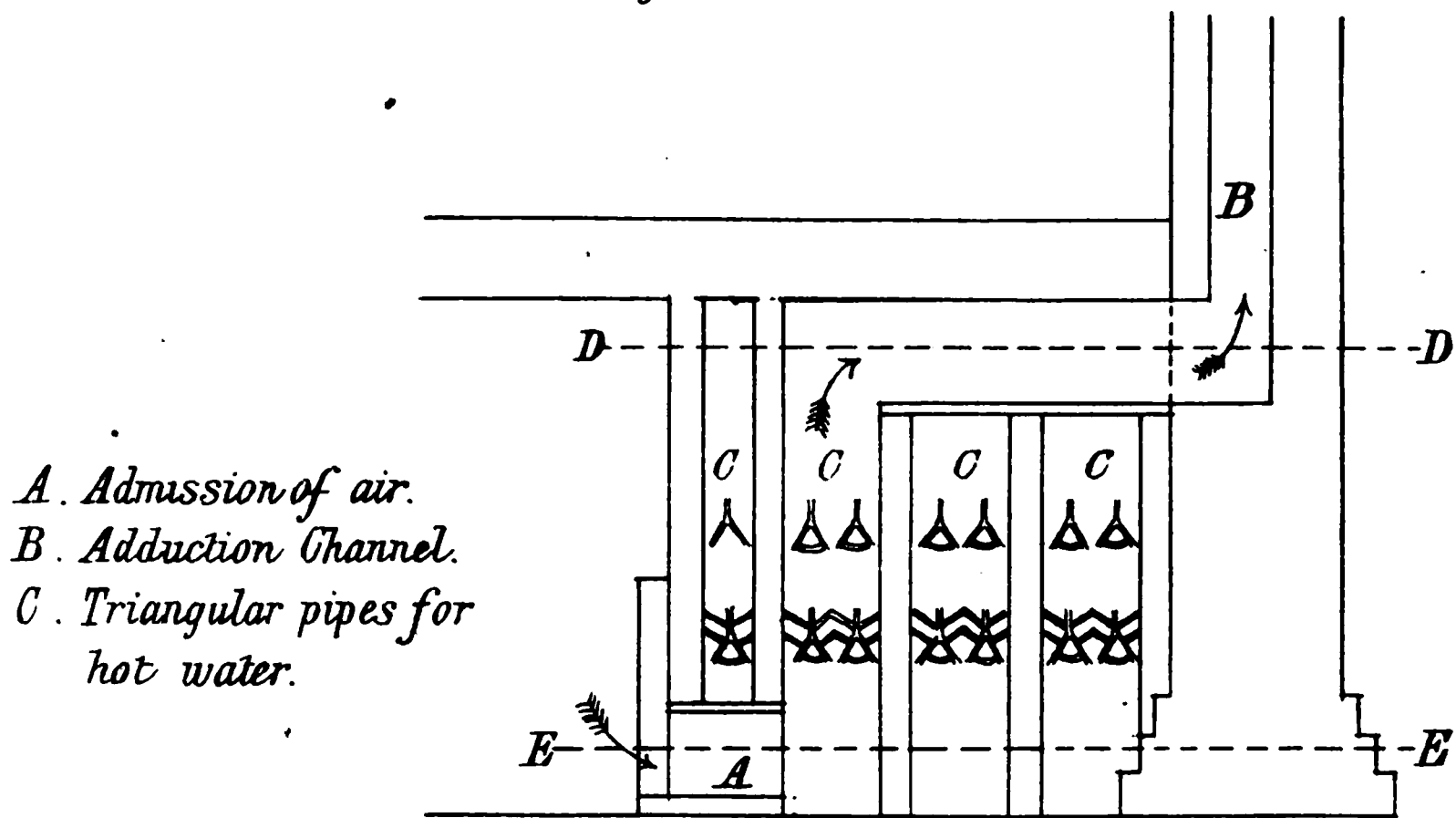


GUY'S HOSPITAL

VENTILATION.



Section through Smoke and Vitiated air Channels.

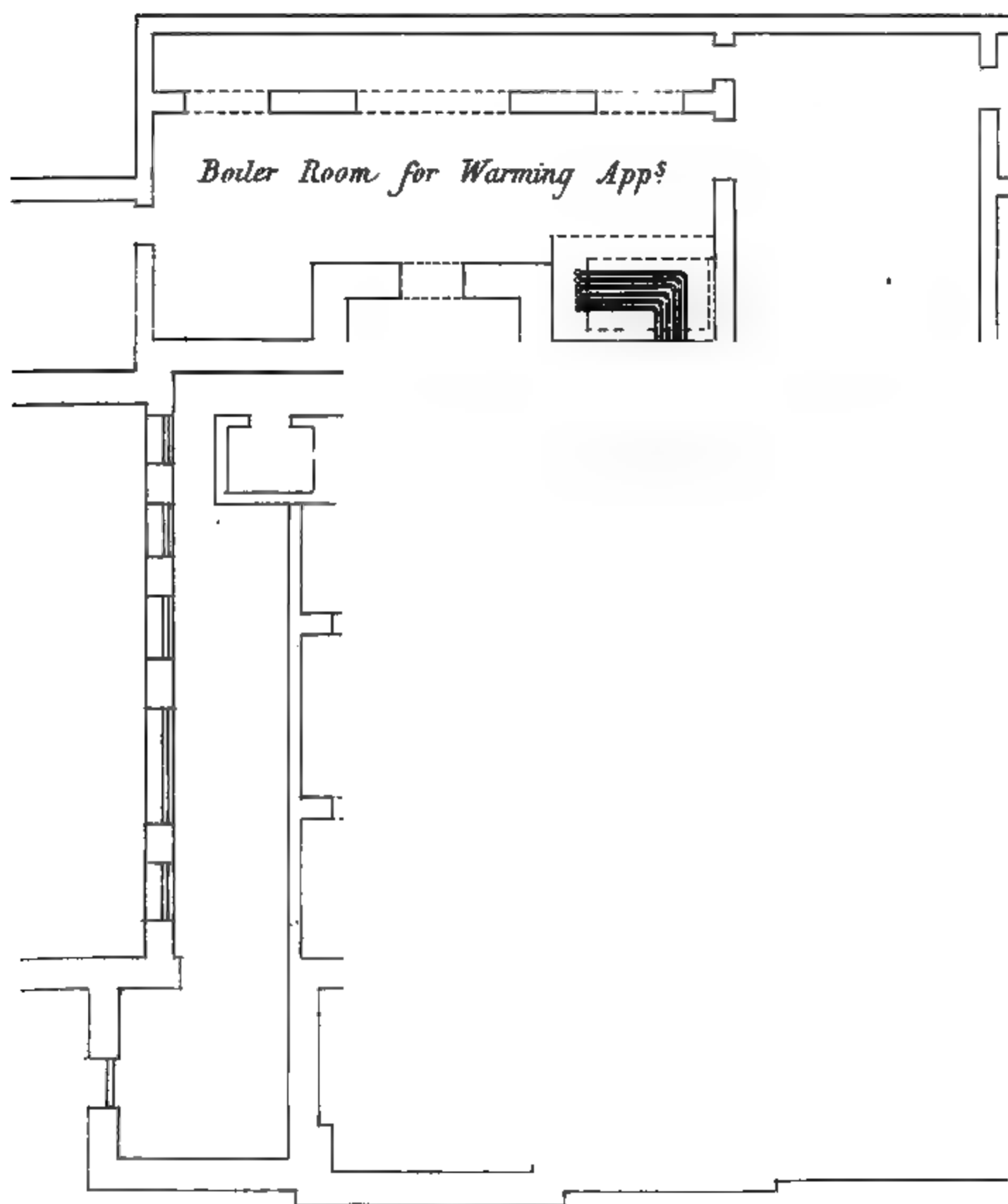


- A. Admission of air.*
- B. Adduction Channel.*
- C. Triangular pipes for hot water.*

*Transverse Section through
App's Chambers.*

GUY'S HOSPITAL

VENTILATION.



Plan of Basement.

ON
VESICO- AND RECTO-VAGINAL FISTULÆ,
AND
RUPTURED PERINÆUM, &c.

BY THOMAS BRYANT.

IN the following paper I propose to make a few remarks on the subjects of vesico-vaginal and recto-vaginal fistula; to note down the principal practical points the observance of which are essential for success in such operations; and to demonstrate by the short record of typical cases the best means for their performance. I shall also illustrate in the same way the surgical treatment of ruptured perinæum, both simple and complicated, and, I trust, prove satisfactorily that the most severe examples of these affections are capable of repair, and that surgery has its triumph in this department of practice no less than in others.

CHAPTER I.

ON VESICO-VAGINAL AND RECTO-VAGINAL FISTULA.

It is neither necessary for me to enlarge on the causes of these affections, nor to dwell on the miseries which such conditions entail on the unfortunate women who are their subjects.

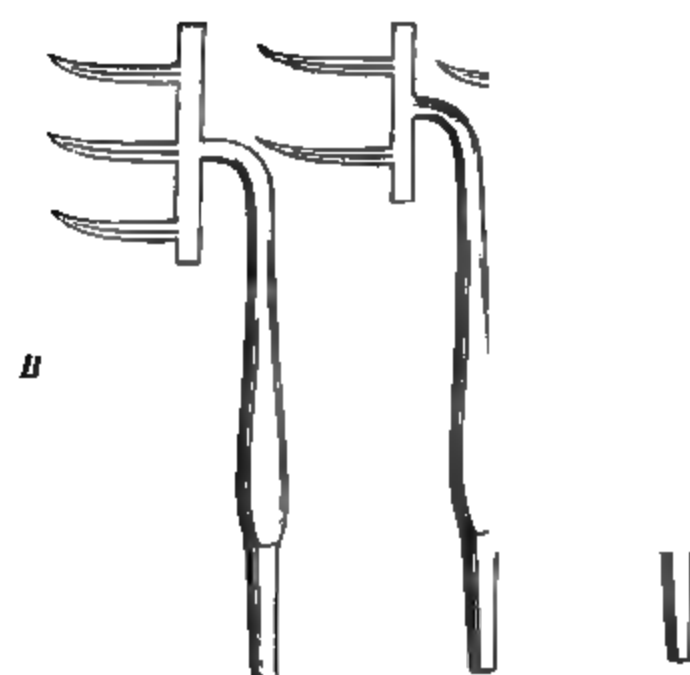
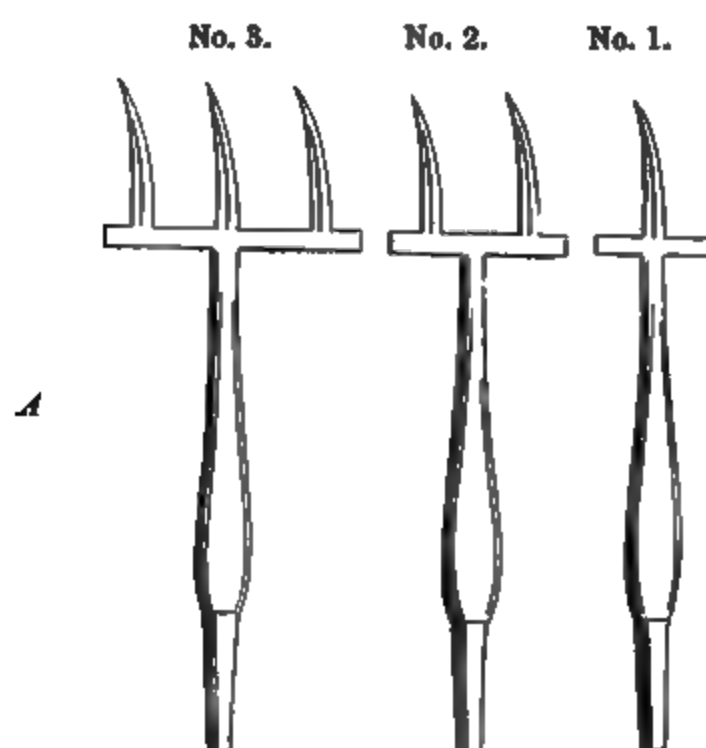
The latter are too well recognised by all people ; and, as a surgeon, it is satisfactory to be able to prove that in the majority of, if not in all, such cases relief can be afforded, if not complete restoration to the normal condition.

In the treatment of recto- or vesico-vaginal fistula there are two chief objects which the surgeon has in view.

First, to pare with nicety and accuracy the whole margin of the fistula ; and, *secondly*, to bring into, and to maintain in, close apposition the raw and incised surfaces. If these two ends be secured, the means by which they are attained are comparatively of small importance, although their simplicity is a point of considerable value. The chief difficulties of the operation are, it is allowed, generally met with in carrying out the first object we have mentioned, and its ultimate success most unquestionably depends upon the mode in which this step has been performed ; for, however well the second step in the operation may be executed, failure must ensue if the first has not been fairly accomplished. The hope and aim of the surgeon in these cases is to secure union of the pared edges of the fistula by primary adhesion, and to obtain this result two clean and even surfaces must be placed and kept in apposition. Surgeons who have attempted to pare a fistulous opening, situated either on the surface of the body or in the vagina, well know what care is demanded to prevent any irregularity or raggedness of the wound's surface, and they well know that if this irregularity exists, primary adhesion of the edges cannot take place. It is this difficulty which, I believe, too often necessitates the repeated operations we hear of for the cure of a vaginal fistula ; and it was to obviate such that I was led some four years since to the construction of the instruments which are illustrated below (modifications of that formed by Mr. Hillyard, of Glasgow), and which subsequent experience has fully proved to be of great value. I have reason to know that in other hands as well as in my own they have been equally serviceable, and that they have tended to facilitate the performance of a difficult operation, and render it more certain and satisfactory.

The advantages which are gained by the use of the instrument, are, *first*, the certainty with which the whole margin of

the fistula is incised ; and, *secondly*, the accuracy with which the width, length, and evenness of the incision is secured.



No. 3. No. 2. No. 1.
A. No. 1, 2, 3, Guides for transverse fistulae. *B.* Guides for vertical fistulae.

The following are the directions for its application :

Assuming that an operation for vesico-vaginal fistula is to be performed, and that the fistulous opening is an inch long,

the guide with three prongs (No. 3 A or B) should be selected, its width being sufficient to include the whole upper margin of the opening. The extent of surface to be pared should then be mapped out with a scalpel, a third or half an inch of raw surface being desirable when it can be obtained, and the prongs of the guide inserted at the edge of but not through the mucous membrane of the bladder, and passed *between* the tissues, beneath the vaginal mucous membrane to the required extent; the ends of the prongs should then be made to perforate the mucous lining of the vagina, at the line of incision already made by the scalpel, and with a blunt hook

View of vesico-vaginal fistula with pronged guide introduced, and knife with which the upper margin is to be incised.

- | | |
|---|---|
| <i>a</i> The os uteri. | <i>b</i> The anterior wall of the vagina. |
| <i>c</i> The fistula, with the mucous membrane of its upper margin perforated by the No. 3 guide, preparatory to its removal. | |
| <i>d</i> The urethral orifice. | <i>e</i> portion of mucous membrane mapped out for removal. |

The body of the patient is supposed to be turned over two thirds on to the abdomen.

the tissues thus included should be well pressed down to the prongs' base; the whole of this surface thus raised by the guide is then to be excised by one sweep of the scalpel, passed along close to the posterior margin of the instrument.

By this means the cleanness of the wound is guaranteed, and its extent accurately determined, not the slightest fingering or chance of causing any irregularity in the wound's surface is experienced; indeed, with the exception of the subsequent introduction of the needle, no instrument need touch the surface of the wound a second time. The lower margin of the fistula should then be treated in the same manner as the upper, thus completing the first and most important step of the operation.

The second step of the operation remains to be described, and although it may be equal in importance to the first, it is not one of difficulty, yet at the same time it requires some nicety in execution. The object is to bring the raw surfaces of the fistula into close apposition, and to maintain them there. This is to be carried out by means of sutures, the wire being the most convenient. The sutures should be sufficiently close to ensure the accomplishment of the object for which they are introduced, and may be fastened in any way which the operator prefers. The perforated shot applied to the twisted end of the wire answers every purpose, both fixing the wires and protecting their points. There is one point, however, of essential importance to be remembered in this the second step of the operation, and that is the distance at which the sutures are to be inserted from the margin of the wound; as a rule, the greater the distance the greater the advantage to be gained—a third, or half an inch or more being desirable. The edges of the wound are not to be adapted too tightly, for swelling will occur, and, as a result, ulceration in the line of suture is sure to follow. This point is as essential in all plastic operations as in the one we are now considering.

The sutures may be left in for six or eight days or more; but I believe it best to remove them as soon as the wound is healed, no good object being obtained by leaving them longer, and in some cases ulceration may be set up, which may interfere with, if not mar, the ultimate success.

The urine should be drawn off periodically after the ope-

ration, but it is not necessary to irritate the bladder by retaining the catheter in it.

A good opiate suppository should be given to relieve pain or local spasm, and perfect cleanliness is to be enforced during the treatment.

To illustrate the practice I have just briefly sketched the following cases may be related. The first two have been already published in a short paper printed in the 'Transactions of the Medical Society of London,' for 1861, but as they were amongst the first in which I employed my new instruments, I have taken the liberty of republishing them in the present form.

CASE 1. *Vesico-vaginal fistula, under the care of Dr. Oldham and Mr. Bryant, from notes by Mr. Stamper.*—Esther H—, a married woman, æt. 40, was sent up to Guy's Hospital from Wales, by Dr. E. Lloyd, for operative relief. She was a healthy woman, and had given birth to seven children, the last being a year and a half old. The presentation was a cross one, and evisceration of the child was required after labour had existed eighty-four hours. Two weeks subsequently she first observed that her urine came through the vagina, and since that period none had passed the right way. On making a careful examination, an enormous fissure was detected in the upper part of the vagina, readily admitting three fingers into the bladder, the neck of the uterus forming its upper boundary; the parts were, however, soft and healthy. The extreme size of the fistula, and the fact that the uterus formed part of its walls, were points which appeared to militate much against a successful result to any operative measures; nevertheless, upon the strong recommendation of Drs. Oldham and Hicks, I was induced to undertake the operation, with the hope that some benefit, at least, might be conferred upon the patient.

On May 8th, 1861, with the woman turned two thirds over upon her abdomen, and under the influence of chloroform, the operation was performed. A free section of the edges of the fistula was made, this part of the operation having been considerably simplified by the use of the instrument already described. Three metal sutures were inserted some lines from the margin of the wound, one of them being passed through

the neck of the uterus, and Bozeman's splint applied, a catheter was then passed, and left in the bladder, and a grain of opium ordered twice a day. Everything appeared to be going on well till the fifth day, when the patient, fancying that her bowels should be relieved, strained violently; this straining being accompanied with a gush of urine from the vagina, and expulsion of the catheter from the bladder; the latter, however, was reintroduced, and the next day the whole of the urine appeared to pass through that channel. Under these circumstances, it was not thought necessary to make any vaginal examination, fearing that such might again disturb the parts. The next night the catheter again became stopped up, and in the morning at least ten ounces of urine were drawn off. This fact was satisfactory, as it clearly indicated a complete closure of the wound. The bladder also resisted the presence of the catheter; this was accordingly removed, and the urine was ordered to be drawn off at short intervals. From this date everything went on well. On the seventh day, an elastic catheter was passed, and ten ounces of urine were withdrawn. On the twelfth day after the operation, and seventh after the expulsion of the urine through the vagina, a careful examination was made; when the splints and sutures appeared to be firmly in position, and the tissues were free from all signs of inflammation. No indications of the passage of urine through the fistula could be detected; it was, however, deemed desirable to leave things as they were for a few days longer, as only seven days had expired since the urine had passed through the fistula.

On the fourteenth day after the operation the splint was removed, and we had the satisfaction of proving that a perfect cure had been obtained. The edges were beautifully in apposition, and looked quite healthy, cicatrization being nearly complete. The bladder could retain half a pint of urine without inconvenience, and the vagina was as dry as natural. The patient remained in the hospital another fortnight, and returned home cured. She has since been heard of, and the cure was still perfect.

CASE 2. *Vesico-vaginal fistula, under the care of Dr. Braxton Hicks and Mr. Bryant.*—Mary H—, æt. 23, was

admitted into Guy's Hospital on April 3rd, 1861. She was a married woman, and had given birth to five children, four of which were stillborn. The last confinement had taken place one year previously, and the presentation was a footling. Since that date her urine had passed freely from a fistulous opening in the bladder through the vagina. She had been operated on twice previously, six and three months respectively prior to her admission, by a surgeon of great skill; both operations having been spoilt by profuse secondary hæmorrhage into the bladder, and rupture of the parts. When admitted, a careful examination was made, and a fistulous opening into the bladder, large enough to admit the finger, was observed high up; the edges were healthy, but the vagina at this spot was somewhat contracted.

On May 1st, with the patient turned two thirds over on to her abdomen, and under the influence of chloroform, I **freely** pared the edges of the fistula, using the ~~same~~ instrument as a director; as in the last case, three metallic sutures were introduced, and the perforated shot splints applied; a catheter was passed and fixed in the bladder, and a grain of opium ordered to be given every six hours. Everything progressed favorably; and on the eleventh day the splints and sutures were removed, perfect cicatrization having taken place. The bladder remained somewhat irritable after this date, and continued so when the patient left the hospital on May 30th; although in this respect, under the influence of tonics, she was gradually improving. She left to go abroad with her husband, who was a soldier.

It will be observed that since the publication of the two cases just quoted, many points of practice which were then employed have been given up. The simple wire suture secured by a shot has taken the place of Bozeman's splint, and the periodical introduction of the catheter for its constant wearing. The free use of opium by the mouth has likewise been discontinued, the occasional suppository having taken its place.

CASE 3.—*Vesico-vaginal fistula; operation; recovery.*—Mary C—, æt. 37, was admitted into Guy's Hospital, under my care, on September 19th, 1864, with a vesico-vaginal fis-

tula nearly one inch in diameter. She had been sent up to me for treatment by Mr. Holman, of Uckfield, Sussex. She was a married woman, and had given birth to eleven children. In her last confinement she was delivered by means of instruments, and on that occasion the fistula was produced. It had existed for five months. The fistula was situated at the upper part of the vagina, close to the neck of the uterus; its edges were healthy, and free from cicatricial bands. The whole of the urine passed through the fistula, and the external genital organs were excoriated and inflamed from the irritation which it had produced. The woman's health was far from good. Tonics were consequently given, and perfect cleanliness observed for several weeks, under which the woman's general health much improved, and the genital organs became more healthy. On October 21st the operation was performed.

The woman was placed on a table, and turned two thirds over on her abdomen, with her pelvis well raised by pillows, the right leg being elevated and supported, the left falling over the end of the table, and likewise held. Chloroform was administered, the duck-bill speculum was next introduced, the posterior wall of the vagina held well back by means of an assistant, and the whole vagina thoroughly sponged out, a good view of the fistula being thus obtained. By means of a long scalpel the amount of mucous membrane was mapped out which it was considered requisite to remove, and the largest-sized pronged guide (No. 3) introduced; its points were inserted at the margin of the upper lip of the fistula, close to the mucous lining of the bladder, and passed carefully beneath the mucous membrane of the vagina to the line of incision as previously mapped out; the intervening tissues were then well drawn down by means of the blunt hook to the base of the pronged guide, and the whole cleanly cut off by passing the scalpel along the under surface of the transverse bar. The lower lip of the fistula was subsequently treated in the same way, when its whole margin was found to have been cleanly pared; four silver wire sutures were subsequently introduced by means of the hollow needle, and their ends permanently held and protected by the perforated shot. The bladder and vagina were washed out with cold water, and a suppository of ten grains of compound soap pill introduced into the

rectum, the woman being placed in bed, with her knees bent and legs tied together ; everything went on very favorably from day to day, although the patient, who was somewhat weakened, expressed herself as suffering much. The urine was drawn off at regular intervals, and the vagina, which was free from urine, daily washed out. On the eighth day the parts, on being carefully examined, were found to be quite healthy, and to have united. The sutures were consequently removed, and in another week she was declared to be convalescent. She remained in the hospital for a short time longer, and left for her country home quite sound.

CASE 4.—*Recto-vaginal fistula ; operation ; recovery.*—Mary P—, æt. 40, a married woman, was admitted into Guy's Hospital on May 31st, 1863, under my care and that of Dr. Oldham, with a recto-vaginal fistula of one year's standing. The opening was situated about one inch and a half up the vagina, and was nearly one inch in length ; its margins were healthy, and of good consistence. The line of furrow was nearly vertical. On June 14th, the bowels having been freely opened the day previously, the operation was performed. The woman being placed on her back, with her legs drawn up and held as in the lithotomy position ; chloroform was given. With the duck-bill speculum the anterior wall of the vagina was held fairly out of the way, and a good view of the fistula secured. By means of sponge and water the parts were then thoroughly cleansed, and the operation commenced. The amount of surface which was to be pared was first sketched out by a sharp-pointed bistoury, and the No. 3 B pronged guide introduced to the right margin of the fistulous opening ; the half circle of integument, which it was considered right to remove, was then well pressed down to the prong's base by means of the finger and the blunt hook, and cleanly cut off by one sweep of the knife passed along the bar of the instrument ; the other margin of the fistula was treated in the same way with equal facility, and the first step of the operation was satisfactorily completed. The application of a cold sponge soon stopped all bleeding, and the sutures were next introduced. These being readily applied by means of the curved mounted needle, four silver wire sutures were put in, and their

ends fastened by large perforated shot, the margins of the wound being well pressed together, these shot at the same time protecting the opposing surface of the vagina from the irritation caused by the exposed ends of metal wire. A suppository of compound soap pill was given, and the parts thoroughly cleansed with cold water, the woman being replaced in bed. It is unnecessary to give a daily account of her progress, for it was most satisfactory; the parts were all kept very clean, and the urine was drawn off at regular periods. Good diet was given, and a free use of stimulants allowed.

On the eighth day the sutures were removed, and the whole fistula was found to have been firmly united. The bowels soon acted naturally, without pain or any evil effect, and in another fortnight the patient left the hospital, in all respects a sound and healthy woman.

CASE 5.—*Recto-vaginal fistula; operation; recovery.*—I was consulted by my friend Dr. George Frederick Farr, of West Square, in the case of a lady æt. 26, who was the subject of a recto-vaginal fistula, following a tedious natural labour, four and a half months previously. The fistula was situated about an inch or so up the vagina, and was about the size of a sixpence. The parts around were quite healthy. The bowels having been well cleaned out the day previously, and a simple enema given in the morning of January 16th, 1863, the operation was performed. The patient being placed fully under the influence of chloroform, the pronged guide No. 2 was employed, and the margins of the fistula readily pared in the same way as we have already described. Three silver wire sutures were introduced, and the wound well closed, the edges being firmly pressed together with the finger before covering up the parts; this provision being of value in squeezing out any small clots of blood which may be present to interfere with rapid union, and bringing the surfaces of the wound closely into apposition. The suppository, as usual, was introduced, and the patient placed in bed.

Everything went on from day to day as satisfactorily as could be wished. On the eighth day the sutures were withdrawn, good union having taken place. The bowels acted

naturally soon afterwards, and without any bad result to the parts, and convalescence speedily took place. The patient's ordinary diet was allowed from the first.

CHAPTER II.

ON THE OPERATION FOR THE RELIEF OF A LACERATED PERINÆUM AND SPHINCTER ANI, &c., WITH SOME OF ITS COMPLICATIONS.

THE principles of practice which have been laid down for plastic operations in the vagina, for the relief of the vesico- or recto-vaginal fistulæ, are in a measure applicable to cases of lacerated perinæum, whether simple or complicated, for the objects of the surgeon in both classes of cases are very similar, and they are to be secured by the same ends, the means for obtaining them requiring only such modifications as the change in the situation of the parts affected necessarily demands.

The points which claim attention in this operation are not numerous, although they are most important; success being secured only by their close observance.

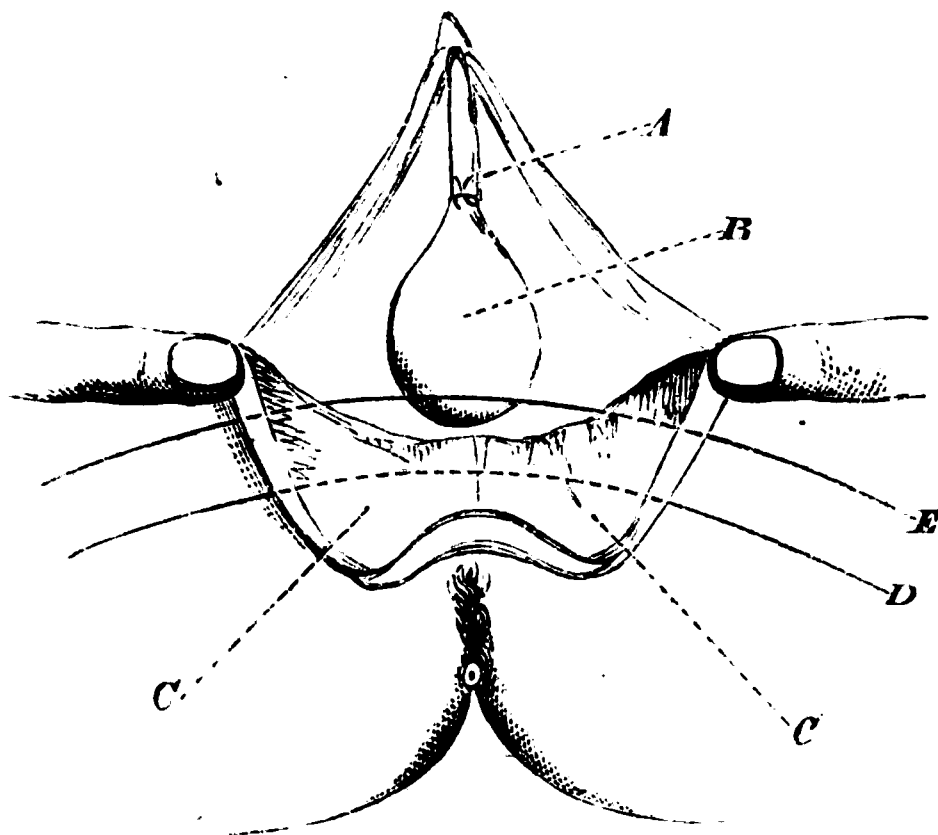
They may be described as follows :

The surgeon having carefully examined the parts, and determined the important question of how much of the lacerated perinæum requires closure, should place his patient on her back in the lithotomy position, and map out the portion of the membrane which he intends to remove, with a sharp scalpel.

He must remember, as a point of primary importance, that the surface of the wound should be *clean and regular*, for it is essential to secure primary union of the two surfaces; the new perinæum also, to be of permanent service, must be *firm, strong, and thick*; for if otherwise, the success of the case will be but partial or of little permanence.

To secure these two objects, a free and clean section of the lacerated perinæum is absolutely essential; it cannot be made

too smooth, nor can the surfaces to be placed in apposition for union be too broad posteriorly towards the rectum ; at least an



A Urethra.

B Orifice of vagina.

C Surface of perinæum, bared of its mucous covering, with the anterior border of recto-vaginal septum.

D Line of introduction of first deep suture.

E Of second deep suture.

inch of raw surface is not too much, when it can be secured, the width of the bared surface diminishing slightly towards the anterior portion of the labia. The best plan to obtain these results is to perforate the parts towards the centre, and as it were slit them up with one sweep of a sharp scalpel ; the right half of the perinæum being first treated, and the left subsequently, the whole area having been mapped out previously by a bistoury.

This *first* step of the operation having been performed, the second, which is of no less importance, remains to be carried out, and that is the bringing of the parts into apposition and keeping them there by sutures. Wire sutures are probably the best for these purposes, for if they do not cause less irritation than smooth silk they are at any rate more manageable. Each one should be inserted at least half an inch, or, better still, an inch from the margin of the wound, and brought out at its posterior border close to the vaginal mucous membrane ; it should be then reintroduced at a cor-

responding point on the opposite side, and brought out at a spot similarly situated to the one at which it was introduced. When the recto-vaginal septum or sphincter ani has been lacerated, the introduction of the posterior suture is of critical importance, for it is an essential element of success that this septum should be likewise included and drawn forwards to the raw surface of the perinæum by the suture. To secure this end the suture must be introduced, as already described, at a point situated on a horizontal line passing through this septum; the needle is to be dipped well into the thickness of the tissues, and instead of making its appearance at the posterior margin of the wound, close to the vaginal mucous membrane, is to be made to pass through the thickness of the recto-vaginal septum, and then out of the right buttock, at a point corresponding to the one at which it was inserted in the left side. When this is well done the wire or silk is buried completely in the tissues, and on being tightened the whole parts are drawn together, as it were towards a centre, corresponding to the anterior portion of the anus and posterior of the perinæum. The other anterior sutures may be applied as already directed.

With respect to the necessity of dividing the sphincter ani in this operation, I will only add that I have not yet met with a case requiring such treatment.

The sutures need not be removed at too early a period, the eighth or tenth day being generally the best, but when good union has taken place, the practice of leaving them in position is certainly unnecessary, if not injurious. The *urine* should be drawn off at regular intervals, and the *bowels* kept quiet by means of opium. The ten-grain suppository of the compound soap pill, after the operation, is a valuable practice in this as in all cases of abdominal surgery, for it allays local spasms, keeps the bowels in a quiescent condition, and secures rest to the stomach, which, after chloroform, is so apt to be irritable. Perfect *cleanliness* is essential during the whole treatment of these cases; and the horizontal posture is to be maintained, the legs being tied together. The patient's diet should be liberal and much as usual.

Success in these cases depends much upon what are termed small matters, and it is of great importance to give them due

care and attention, for recovery may, as a rule, be secured in all these cases, however complicated.

I shall now proceed to quote a few cases illustrative of the practice I have laid down. They are successful examples and may be taken as types of all others.

CASE 6. *Laceration of the perinæum, completely through the sphincter ani, and at least one inch of the recto-vaginal septum; operation; recovery.*—Alice H—, æt. 35, was admitted into Guy's, under Dr. Oldham's and my care, on June 3, 1863. She had been the subject of this distressing condition for eight years, the laceration having followed her first natural labour; she had had five children since, and it was believed that during the last confinement some increase of the original mischief had been sustained. Her general health was very good, and the genital organs were quite healthy.

On making a careful examination of the parts, I discovered the most severe laceration which it has fallen to my lot to witness; the vagina and rectum were literally converted into one large orifice; the sphincter had been completely torn through with the perinæum, and at least one inch of the recto-vaginal septum had been likewise divided, the mucous membrane of the rectum bulging forward into the vagina. The fæces and flatus passed without any hindrance, for no indication of control over the anal orifice existed.

I undertook the treatment of this case with considerable apprehension, for I expected that if the perinæum and anal orifice could be restored, a recto-vaginal fistula would be left, although a second operation might succeed in its ultimate occlusion.

On June 12th, 1863, I proceeded to operate, the lower bowels having been the day before completely cleared out by purgatives and enemata.

The patient having been brought under the influence of chloroform, was placed upon her back, as in the position for lithotomy, and with the scalpel the margin of the labia and perinæum, backwards to the anus, were stripped of their mucous coverings, for at least three quarters of an inch in width; the margins of the lacerated recto-vaginal septum were then pared with the transverse border of the septum. The

whole surface of the parts to be brought together were thus completely stripped of their mucous covering, and had now to be adjusted by means of sutures. Silver wire sutures were employed.

The first, the most important, was inserted at the lower part of the wound as the patient rested, and into the left buttock, at least one inch and a half from the margin of the fissure, and in a line parallel with the recto-vaginal septum, the needle was passed well into the tissue, and insinuated unseen horizontally through the transverse border of the recto-vaginal septum and up through the tissues of the right side, coming out on the right side at a spot corresponding to the point of entrance on the left; during its passage it was completely buried in the tissues; the needle and wire were then drawn through, and when the latter was tightened, the sides of the perinæum and divided border of the sphincter and anus, with the recto-vaginal septum, were well drawn up together firmly in apposition; two other sutures were introduced to bring the anterior border of the perinæum together, a suppository introduced, and the patient placed in bed. An uninterrupted progress towards recovery marked the subsequent history of this case; the wound healed most kindly; the posterior or most important suture was removed on the eighth day, and the other two on the tenth; in another day the bowels acted, and the motions passed along their natural channel; the sphincter soon showed evidence of its power by controlling the action of the bowels and retaining flatus, and in six weeks from the day of operation the patient left the hospital quite well.

CASE 7. *Ruptured perinæum and sphincter ani; no control over action of the bowels; operation; recovery.*—Eliza B—, æt. 28, a married woman, the mother of four children, was admitted into Guy's, under Dr. Oldham's and my care, on May, 1863. She had been the subject of her present condition for four years, the laceration having taken place during her first confinement, which was a very tedious one.

The whole perinæum had been completely torn through, with the sphincter ani. Fæces and flatus passed without the slightest control, rendering the woman's life wretched. Her

general health was good, and altogether the case presented a very favorable prospect for operation.

On June 20th the woman was brought under the influence of chloroform, and placed upon her back in the lithotomy position; the lacerated borders of the perinæum backwards to the anus, together with its anterior lacerated margin, were then completely bared of their mucous covering, a good broad surface—varying from half to three quarters of an inch—being removed. Three silver sutures were next introduced, the posterior one being passed through the recto-vaginal septum, and all introduced at least one inch from the margin of the wound. An opiate suppository was also given.

On the ninth day the sutures were removed, good union having taken place; on the fifteenth, the bowels acted naturally, and complete control over the sphincter was rapidly regained, the woman leaving the hospital in all respects sound and well.

CASE 8. Laceration of the perinæum down to sphincter, with prolapse of the anterior wall of the vagina; operation; recovery.—Fanny C—, æt. 38, a healthy married woman, was admitted into Mary's Ward, Guy's Hospital, under Dr. Olds ham's and my care, on September 16th, 1863. She had had one child twelve years previously, and it was on that occasion her present injury was received. She had been operated upon four years afterwards by a physician-accoucheur, but without success, the union having been but partial and very thin.

On October 7th, chloroform having been given, the patient was placed on a table, on her back, with her legs flexed and raised; the sides of the perinæum were then very freely stripped of their mucous covering backwards to the sphincter, at least one inch of surface in width having been removed, and four silver sutures introduced. The vagina having been closed as completely as possible consistent with the maintenance of its natural uses, an opiate suppository was given as usual.

On the ninth day the sutures were removed, and good union had taken place. The woman remained in the hospital some little time after, and a good solid perinæum was found to have been formed. The prolapse of the vagina was cured, with all other inconveniences, the patient leaving quite well.

CASE 9. — *Lacerated perinæum completely through the sphincter ani, with prolapse of the posterior wall of the vagina; operation; recovery.*—I was asked by Mr. Pocock, of Brixton, in August, 1863, to see a lady, æt. 30, who for two years had been rendered miserable by her inability to control the actions of the bowels, except when very constipated. The injury had been received during her first and only confinement; the labour having been a natural one, although very tedious.

On examining the parts, I found that a most complete laceration of the perinæum had been sustained, and that this laceration had extended through the external sphincter of the anus, the posterior wall of the vagina bulged considerably forwards, and when the patient stood it fell still more, even externally.

On August 24th, the patient's bowels having been previously thoroughly cleansed by an aperient and enema, chloroform was given, and the operation performed. The posterior borders of the perinæum were freely pared, together with the anterior margin of the anus, a piece of the mucous membrane of the posterior wall of the vagina, beginning at the sphincter, being also removed. Three silver sutures were next introduced, the posterior one the first, the wire being made, as in the other cases related, to pass through the anterior border of the recto-vaginal septum. The ends of the wires after being twisted were secured and protected by perforated shot.

On the eighth day the sutures were removed, the wound having healed kindly. The bowels subsequently acted spontaneously, and a good convalescence followed, perfect control over the action of the bowels having been secured, and the tendency to the vaginal prolapse prevented.

CASES AND OBSERVATIONS IN MEDICAL JURISPRUDENCE.

By ALFRED S. TAYLOR, M.D., F.R.S.

Poisoning with arsenic in Vermin powder ; recovery of three children from large doses. Carelessness in the keeping of poisons.

IN the following cases I was consulted by Mr. Boxall, of Swindon. Although the exact quantity of arsenic taken by each child could not be determined, there is no doubt that the dose was large. Mr. Boxall furnished me with the subjoined account of the cases from notes taken on the spot.

About 3 a.m. on January 4th (Sunday), 1863, I visited the family of a Mr. Pound, residing at Little Hinton, near Wimbomborough, Wilts, and found that three of his children, of the respective ages of fifteen and nine years (daughters), six years (son), were suffering from the effects of some poison which had been swallowed about 3 p.m. of the preceding day, Saturday. I noticed but little suffering expressed by the two elder children, saying that they complained of unusual thirst, and some slight sensation of nausea, but no vomiting. I prescribed a full dose of castor-oil for each of the children, and milk to be freely administered as a beverage, with warm water to keep up vomiting, if induced. The other child, a boy six years old, was not so fortunate as his sisters, who, it appears, had not partaken so freely of the "mice poison," and thereby suffered less. The boy began to be very sick and thirsty

about 5 o'clock on Saturday afternoon, January 3rd, 1863 (about two hours after the poison had been taken); the vomiting continued through the night, and until about half-past 10 o'clock on Sunday morning, when it abated, but it continued, more or less, until the following day, Monday.

When first taken the boy did not complain of pain, but shortly afterwards he had pain in the bowels and chest (stomach), with drawing up of the limbs; the pain ceased about 2.30 a.m. (Sunday). The two older children began to be ill about 8 p.m., Saturday (five hours after taking the poison); they suffered from vomiting, pain in the bowels and chest (stomach) like the boy, but the symptoms were not so severe. A sister of these children, seventeen years old, tasted the "poison powder," which caused her tongue immediately to become *dry and white*, and she, not having swallowed any, was exempt from suffering.

The account given by the mother was as follows:—She went to a neighbouring village on Friday, January 2nd last, and left a basket at a grocer's shop for some shop goods, which was brought to her house by a baker on the following day, about 3 p.m. She had not ordered or purchased any poison, and was not aware that any poison had been sent by the grocer. It appears that the daughter, aged seventeen years, took the groceries out of the basket and placed them on the kitchen table, and took out also a small paper parcel, and put it by in a cupboard; the three other children, aged fifteen, nine, and six years, observed this; they subsequently took it from the cupboard, and tasted the contents, remarking that the powder was "very sweet," and like "*biscuit* powder." The whole was eaten up by the three younger children, the eldest girl having only tasted it and spat it out. Inquiry was made of the grocer whether he kept any poisons in his shop, and whether there was any poison in the house at the time the groceries were packed up. An answer was returned that there was no poison then in the house, but that some three months ago there was some, and which had been "twisted up in paper parcels," and placed on the corners of the shelves in the shop. The grocer's daughter stated that she "heard something fall into the basket, she looked into it, but discovered nothing."

January 4th, 1863, 3 a.m.—Symptoms of the boy six years old. Sunday :—Appears to be very ill. Intense vomiting and thirst ; no pain in the bowels, even on pressure ; no pain nor tenderness at the pit of the stomach, and no purging. Countenance expressive of anxiety, indicative of the patient having suffered much ; dark areolæ around the eyes, which are somewhat staring ; tongue whitish ; pulse quick, and somewhat jerky at first, but lowered in power and frequency. A mustard poultice was ordered to the abdomen, with fomentations. Castor-oil was given, and vomiting was promoted by giving freely warm water and milk. Similar treatment was adopted with respect to the two elder children ; castor-oil with barley-water and milk were given at intervals. Vomiting subsided, but the bowels were freely opened.

In the case of the boy, the vomiting continued during the day (January 4th). There was no pain in the belly, nor heat in the œsophagus or stomach ; he complained of thirst. The bowels were acted on by castor-oil. There was no tenesmus nor excoriation of the anus.

5th, 11 a.m.—Visited the boy, who had been vomiting throughout the night, but now is not sick, and does not complain of thirst. Countenance less anxious ; areolæ round the eyes disappearing ; pain and tenderness in the abdomen absent ; tongue whitish, but not furred ; no constipation, but a healthy alvine action. Diet,—milk and farinaceous food. Castor-oil and milk to be given if the bowels are not opened.

6th.—Found the patient much improved. Vomiting altogether absent ; there was no pain or tenderness in the belly on pressure of the hand : bowels open. Diet, &c., the same.

7th.—Progressing very favorably ; absence of every symptom of poisoning.

8th.—Beef-tea, and continue as before.

9th.—Patient continues to do well.

10th—17th.—Visited the patient every day since the 9th ; he is, apparently, quite recovered.

18th.—The two girls suffered less than the boy throughout, and recovered more rapidly.

Remarks.—No portion of the vermin powder could be

procured, but some of the vomited matter and a part of the evacuations in the case of the boy were sent to the laboratory for examination, on the 8th January. They presented the usual appearances met with in poisoning with arsenic; the vomited matter was mixed with blood, bile, and flakes of mucus, and it deposited a sediment in which there were particles of a white substance which was proved to be arsenic. The liquid, after all the solids had been deposited by standing, was so completely saturated with arsenic as to yield an abundant precipitate by a current of sulphuretted hydrogen. It was clear, therefore, that in the case of the youngest child a large dose of the poison had been swallowed, and that the treatment had been successful in removing it from the body. No better treatment could have been adopted than that which was carried out in this case, namely, the promotion of vomiting and purging by frequent doses of castor-oil with milk and barley-water. It proved quite successful even under adverse circumstances, for Mr. Boxall did not see any of the children until twelve hours after the poison had been taken. Had any of the so-called antidotes been given, such as the oxide of iron or hydrate of magnesia, the recoveries in these cases would have been ascribed to the antidote, and not to the real cause, namely, the removal of the poison from the stomach and bowels by vomiting and purging.

As the whole of the poisoned powder had been eaten by the three children, and chiefly by the youngest child, it is impossible to assign the dose. These vermin-powders commonly contain a large proportion of white arsenic mixed with flour and sugar. The fact that the arsenic was not coloured blue or black proves the inefficiency of the Arsenic Act to control the sale of this poison, so as to diminish the risk of poisoning. Another curious feature in the case is the mode in which the packet of vermin-powder, unlabelled as it was, became mixed with groceries bought in a village shop. Whether it dropped into the basket or was accidentally placed there by mistake by persons in the shop, does not appear; but it is obvious that the poison was not kept apart from innocent articles of food, and was neither labelled nor coloured so as to give warning of its dangerous nature. The admixture of sugar with it was an additional circumstance to induce children to eat it. Had any

of the children died, it is possible that the grocer might have been convicted of manslaughter ; but it is also probable, in the present state of the law, that, as dealing with arsenic is left very much to the discretion of shopkeepers, the grocer would have been acquitted on the ground that there was only a small amount of carelessness, not sufficient to reach that degree of "gross or culpable" carelessness which is required by law to support a verdict of manslaughter. As to the amount of illness, short of death, caused by this mode of keeping poisons, the law takes no heed of it. Those who buy groceries in village-shops, must take the risk of having arsenic supplied by mistake for arrow-root or baking powder. If they die their friends may have the satisfaction of attending an inquest, to hear recorded a verdict of accidental death. If they recover, after a fortnight's severe illness and great jeopardy of life, then, should they have the means, they may bring an action for damages against the grocer for injury to health, and take their chance of having it proved by scientific evidence that the illness was not owing to poison !

From an accident of this kind, it is obvious that the parents of these children might have been placed under great suspicion. Had their characters been bad, or any motive apparent for such an act, they might have been charged with an attempt at poisoning. The grocer, not dealing in poisons, might not have been conscious of the accident by which a packet of arsenic was thus transferred to a basket of groceries, and he would then have denied strongly that the arsenic could have come from his shop. Circumstantial evidence in such a case would be so strongly against the parents that their bare denial of the conscious possession of poison would not be credited. It is unnecessary to carry the hypothesis further ; the facts of this case prove that the careless custody of poisons in village shops may not only endanger life, but seriously implicate innocent persons in false charges of poisoning.

The medical aspects of the cases are of some interest. The time at which the symptoms from arsenic first appear after the poison has been swallowed is often material in criminal investigations, and generally each medical witness fixes this according to his own experience ; hence there is some difficulty in getting at any consistent statement. It will be

observed that in the boy, who took the largest quantity, the symptoms commenced in *two hours*. These were, according to the parents, sickness and thirst, followed by vomiting; pain in the abdomen came on subsequently, but this symptom did not exist when the boy was first seen by Mr. Boxall, on the 4th of January. At this time, *i. e.* twelve hours after taking the poison, there was no pain in the bowels even on pressure, and neither pain nor tenderness at the pit of the stomach. There was also an absence of purging. With respect to the two girls, no symptoms of poisoning appeared until after the lapse of *five hours*. This is an unusually long interval, as the average period before the occurrence of symptoms in cases of acute arsenical poisoning is from half an hour to an hour. The first symptoms in the girls were vomiting, with pain in the bowels; but when seen by Mr. Boxall, seven hours afterwards, there was thirst with nausea, but no vomiting or purging. Thus, in children taking arsenic at the same time and under similar circumstances, the symptoms may vary in the time of commencement, their nature, and duration.

These cases also show that white arsenic is either tasteless, or its taste is readily concealed by sugar.

2. Death from Perforation of the Jejunum as a result of disease; death apparently a result of violence.

It is well known as a principle in Medical jurisprudence that death may apparently take place as the result of violence, when a careful post-mortem examination of the dead body may show that this was a mere coincidence, and that the person really died from disease. All cases of this description convey the warning that no medical opinion of the cause of death should be given until after a post-mortem examination of the body has been made. The following case was communicated to me by Mr. Morgan, of Merthyr Tydvil, in whose practice it occurred.

In July, 1864, a man named David Lloyd died under the following circumstances. The deceased was of middle stature, æt. 45, and much given to drinking. He formed one of a number of persons who were helping a farmer during the hay harvest; and, as is usual on these occasions,

there was a good supply of beer, of which the diseased partook very freely.

He then commenced wrestling with one of his companions, and having been thrown down he complained of having strained himself in the abdomen. This took place at about eight o'clock in the evening. He walked home (which was about a mile from the spot where he fell), went to bed, and complained of the most intense pain from this time until his death, which took place fifty hours after the accident.

The medical gentlemen who saw the deceased were of opinion that he had a perforation of one of the intestines.

At the post-mortem examination, the abdomen was very much distended, and upon opening it a quantity of fetid gas escaped. The small intestines were glued firmly together by lymph, showing that there had been severe peritonitis, and, after a deal of trouble, a small aperture, which would not admit a pin's head, was found in the jejunum.

The aperture seemed to have been the result of an ulcer, which had commenced on the outer surface of the intestine, and the man in his fall having strained himself, there can be no doubt that the ulcer then gave way, and in this manner caused the man's death. Of course a verdict of "accidental death" was returned.

Remarks.—But for the careful search made, the peritonitis of which the deceased died might have been referred to violence sustained during the wrestling, or to the result of a fall. Except for the struggling and fall, the man might have lived longer; yet, as the latent disease of the bowel might at any time have given rise to perforation from slight exertion, no criminality could attach to the person with whom the deceased was wrestling. The violence was, it is true, an accelerating cause of death, but under circumstances which could not have been known to the antagonist, and he was therefore exonerated from all responsibility for the result. The lives of persons so situated hang literally upon a thread, whether the insidious disease attacks either the bowels or stomach. The smallness of the aperture in the intestine which led to this fatal attack of peritonitis is also worthy of note.

4. Case of Death from Perforation of the Colon.

The following case of perforation of the colon, furnished to me by Mr. Gill, a pupil of the Hospital, is very similar in its details, and the medico-legal inferences to which it leads, to that above related.

In September, 1864, in a drunken quarrel, a young man, æt. about 35, was thrown down by one of his companions, and in the fall, his abdomen struck against a raised kerb-stone. He was immediately seized with faintness and vomiting, and was at once conveyed to the nearest town and put to bed. When seen, a few hours after the injury, he was found to be in intense pain; the abdomen was tender on pressure; the man was pulseless. He remained much in the same state till about twenty-four hours after receiving the injury, when he died in a comatose state. An inquest was held, and a post-mortem examination ordered, at which Mr. Gill assisted. This was performed within forty-eight hours after death.

The body was that of a healthy looking, well-nourished man; the muscular development was good, and there was much external fat. The abdomen was greatly distended with gas, and was beginning to present a green appearance, as the weather was very warm. A little below the umbilicus, and nearly in the middle line, was a bruise of a dark purple colour, about half the size of the palm of the hand, and it was stated by those who were present that it was on this part of the abdomen that he fell. On opening the abdomen a large quantity of fetid gas escaped; the peritoneum was reddened, and in some parts covered with lymph, and contained a little fluid of a dark colour and feculent smell, with two or three grains of wheat floating in it.

The stomach was carefully examined *in situ*, and then removed, and the nozzle of a bellows was inserted into the duodenum, and on air being gently impelled into the intestine a small perforation, of about one eighth of an inch, was found in the transverse colon, corresponding exactly in situation with the bruise on the surface of the abdomen. There was no other aperture in the intestine. A portion of the transverse colon, about four inches in length, containing the per-

foration, was dissected out, slit up and carefully washed. It was then seen that on the interior of the bowel opposite the perforation, was a chronic ulcer, with a congested and raised margin, evidently of some duration. The ulcer had gradually thinned the wall of the bowel in the centre, so that the accidental violence falling on the weakened spot had caused the rupture of the intestine, and produced extravasation, followed by peritonitis and death.

On inquiry it was subsequently ascertained that the deceased had for some time previously complained of abdominal pains, and had also suffered from attacks of vomiting and colic, though not of a severe nature. The evidence at the inquest went to show that the deceased was so drunk at the time of receiving the injury that he rather fell than was thrown down, and a verdict of "Accidental Death" was returned.

5. Case of Accidental Strangulation; recovery.

Cases of accidental strangulation are so rare that the record of any one may be of service in elucidating the phenomena which attend this form of asphyxia. The notes of the following case, that of a youth, æt. 14, admitted into Guy's Hospital November, 1864, were taken by Mr. C. Puzey, who called my attention to the case soon after the admission of the patient.

John C—, æt. 14, admitted November 17th, 1864. He was working at Shand and Mason's factory, when his neck-tie was caught by the band of the engine, and his neck was by this drawn down against one of the revolving shafts, the handkerchief being knotted, and tightly twisted round his neck. His throat was tightly compressed for about a minute before the tie could be cut, and then his neck was severely cut by the knife. After this he was insensible for six or seven minutes. He then revived, and was able to speak, but could not hold up his neck; blood was coming from the mouth and ears.

When brought to the hospital, soon afterwards, he was sensible; his face was pale, skin clammy; the lips were livid, his eyes suffused, and conjunctivæ injected. He breathed

without difficulty, and complained only of much pain when the head was moved. There was a deep depression all round his neck ; the skin was lacerated and bruised, as was also the right cheek. There were two cuts on the right side of the neck, caused by the knife which was used to release him.

Two or three days after admission that part of the handkerchief which compressed the neck was measured, as also the boy's neck. The circumference of the former was about eight inches, and of the latter twelve inches. This difference accounts for the deep depression on the neck and laceration of the skin.

A drawing of the boy was taken a few days after the accident, showing the mark round the neck in the process of healing. This is placed in the Museum collection. He made a good recovery, and went out in eighteen days.

I saw the boy (with Mr. Puzey) soon after his admission, and he informed me that at the time of the occurrence he felt no pain. He had a sense of choking, and then lost his senses. It would appear that for at least one minute no air could have reached the lungs. There was recovery upon the simple admission of air, for the lungs and brain had sustained no injury from the complete constriction of the vessels of the neck. This corroborates the general medico-legal opinion that complete occlusion of the trachea is attended with immediate insensibility, and that a person may recover in spite of the complete suspension of respiration for one minute.

6. Case of Laceration of the Kidney and Fracture of the Ribs ; no marks of external violence ; power of locomotion after a severe accident.

A man, æt. 60, was brought to the surgery about 6.30 p.m. of the 22nd of November, 1864. He had been run over in Union Street, Borough, an hour before, by a light cart, which was going at the rate of about ten miles an hour. He walked to Mint Street, called on a friend of his, and then came in a cab to the hospital. He was examined carefully by the dresser for the week, who found three ribs fractured. There was no collapse or urgent symptom. The dresser bandaged him up and let him go. He walked home

with his friend to Mint Street, to the lodging where he lived, and went to bed. About 11 o'clock that night a man in the next bed to him saw him sit up in the bed, and almost directly afterwards he saw him fall back again and die.

An inquest was held three days afterwards, and Mr. Puzey made an inspection of the body. There was no bruise or wound of the side—not even the slightest indication externally to show which was the injured side. On opening the abdomen a large quantity of coagulated and fluid blood was found; this proceeded from the right kidney, which was torn transversely completely in half. The ninth, tenth, and eleventh ribs were fractured. There was much congestion of the left kidney. There were some superficial lacerations of the posterior surface of the right lobe of the liver. No other viscus was injured.

Remarks.—This case confirms what has been already observed in other instances; namely, that a severe rupture of the kidney may be produced by external violence without leaving any marks of injury on the skin, and that a person may survive five or six hours and retain a power of locomotion as if no such internal injury existed. The large quantity of blood found in the abdomen was probably the result of slow accumulation after the accident. When the man was examined at the hospital on his admission, there was no symptom to indicate that he had sustained a rupture of an internal organ, likely to prove fatal in a few hours.

7. Poisoning with Laudanum. Recovery of a child from a dose of twelve drachms. Treatment with belladonna.

Dr. Davies, of Brecon, communicated to me the particulars of the following case, and forwarded for analysis a portion of the laudanum and of the fluid drawn from the stomach.

On December 16th, 1864, at 6.45 p.m., A. P—, a girl æt. 11½, swallowed an ounce and a half (3xij) of laudanum in mistake for a black draught. In about half an hour she became sleepy, and perspired very freely; so much so that her mother frequently wiped her face with a cloth. She complained of sickness, but did not vomit. Presently her breathing

became difficult, and she felt giddy; a little later her countenance was of a dark or dusky hue, which greatly alarmed her mother. Dr. Davies was sent for, and arrived at 9.15 p.m. (two and a half hours after the poison had been taken; Dr. Lucas arrived immediately afterwards. The girl was being walked about by two persons. Her head was drooping, the face livid, the eyelids half closed, the pupils quite contracted, breathing slow, pulse 100, and she was in a state of great drowsiness. She could, however, be easily roused when spoken to, and knew those around her.

Treatment.— \mathfrak{Dij} Zinci Sulph., dissolved in two pints of tepid water, was injected into the stomach by means of the stomach-pump, and quickly removed; all the fluid removed the first time was saved, and a portion was sent for analysis, together with a sample of the laudanum. After emptying the stomach \mathfrak{Zvj} of a strong decoction of coffee was introduced, and allowed to remain; in half an hour about two pints of tepid water were again injected and quickly removed, and more coffee injected and left in the stomach. This was repeated in about half an hour, and again in another half hour, when \mathfrak{Dj} Zinci Sulph., dissolved in water \mathfrak{Ziv} , was left in the stomach. This produced slight vomiting. The tube was now introduced, and tepid water injected, which produced free vomiting whilst the tube was in. After the stomach had been completely emptied for the fifth time about \mathfrak{Zviij} of strong coffee were injected and allowed to remain. The patient was kept awake by being talked to, and her feet and legs were fomented with mustard and hot water. She was walked gently about the house. At 11 o'clock she was taken into the open air, and walked about one hundred yards out and back every half hour. Mustard sinapisms were applied to the calves of the legs, but gradually the drowsiness increased, so that she could scarcely be roused; the surface of the body became colder, and at 1.30 a.m. she could not be roused by shaking or loud talking. She had now become quite comatose, the surface was cold, the breathing stertorous (six in the minute), the pulse was small and quick, the lower jaw dropped, the mouth was open, the pupils were quite contracted, with twitching and involuntary contractions of the muscles.

She was now placed upon a couch, with her head and

shoulders well raised, and electro-magnetic shocks applied from the cervical region over the face, chest, and præcordia, those over the face producing much the most powerful effects, rousing her sufficiently to enable her to swallow a dose of the following liquid :—Ext. Belladonnæ, gr. xxxij dissolved in water ℥ij. A teaspoonful was swallowed at 2.40 by the mouth ; also at 2.55 ditto ; at 3.20 injected into the rectum with ℥vj brandy in gruel ; 3.50, by the mouth ; 4.10, ditto ; 4.40, injected with brandy and ℥ij sal volatile ; and at 5.50 by the mouth. The teaspoon being large, *sixteen grains* of the extract were given in the above-divided doses, *i. e.* in three hours and five minutes. Mustard sinapisms were again applied to the calves of the legs, and warm flannels to the body. For some time there was no perceptible change ; gradually the breathing became less stertorous, and changed into a gentle sigh, from six to eight in the minute ; the pulse, at first small and quick (150), gradually became fuller and less frequent (about 125 to 135) ; the pupils gradually enlarged, the surface of the body became warmer ; the mouth, being open, showed the tongue in continual motion, as if projected forward against the lower teeth. These symptoms of improvement regularly increased, so that about 6.50 the pupils assumed their natural size (both equal throughout), respiration about 8 to 12, pulse fuller (120), a diffused red blush pervaded the face, the body became decidedly warm, and it was deemed advisable not to continue the belladonna after 5.45.

At 7 o'clock the girl could be roused by loud talking. After this she improved steadily, and was soon able to swallow some tea ; great drowsiness still continued. After coma came on no attempt was made to walk her about, but it was observed that when she had had several electro-magnetic shocks she would make an effort to push herself off the couch, and attempt to stand, but immediately relapsed into a profound sleep.

Remarks.—The sample of laudanum sent yielded 4·4 per cent. of dry extract of opium. It was compared with, and found to be similar in strength to a good sample made according to the Pharmacopœial formula. It would therefore correspond to forty-eight grains of powdered opium. No

treatment was resorted to until two and a half hours had elapsed, when the contents of the stomach were removed by the stomach-pump, and the stomach well washed out with tepid water and coffee. Dr. Davies informed me that the girl did not vomit any portion of the laudanum until after the use of the stomach-pump. The quantity of fluid thus used and drawn off amounted to thirty-nine ounces. In a small portion which was sent to me meconic acid was detected. It was not until about twelve hours after the poison had been taken that signs of recovery were manifested, and eight hours afterwards, *i. e.* twenty hours after the patient had taken the poison, woke up and conversed rationally. It seems that she took, on the whole, *sixteen grains* of the extract of belladonna without producing any of the symptoms of poisoning by that substance. This was taken after the complete emptying of the stomach by the stomach-pump and emetics, so that any antidotal influence which it might be supposed to exert would be only on that portion of the poison which had found its way into the blood. The extract is said to have been procured from a good source, and, assuming this to have been the case, a tolerance of atropia must have been set up by the action of morphia upon the system.

8. *Recovery from a large Dose of Extract of Belladonna injected into the Rectum.*

In February, 1865, I was consulted by Mr. Gay, in reference to a case in which a gentleman had administered to his wife an injection containing one drachm of extract of belladonna and one drachm of wine of opium, in a diluted solution of subacetate of lead. This, it appears, was the prescription of a medical man whom he had consulted. In about two or three hours after the injection Mr. Gay saw this lady, and he then found her in a state of perfect unconsciousness, from which no means could arouse her. Her body appeared bloated; the abdomen was tympanitic; the skin of the face and upper part of the chest was of a dusky red colour, while in other parts it was pallid. The breathing was quiet, respiration about twenty in a minute; but the pulse was so rapid that it could with difficulty be counted, being 145 to 150 in a minute; the

heart simply fluttering ; the surface of the tongue and mucous membrane of the mouth was dry, the former being of a dark colour. The pupils of the eyes were fully dilated, and quite immovable, even when a strong light was brought close to them. Slight reflex action could be excited on tickling the soles of the feet.

In this alarming state of things Mr. Gay adopted the only course open to him, *i. e.* of washing out the rectum, and removing any remains of the belladonna injection, much of which, it appears, was thus brought away. Ammonia and strong coffee were given to the patient, and in about four or five hours she made some voluntary movements and ultimately recovered.

Remarks.—In this case, but for the removal of the residue of the poison from the rectum, the lady would probably have died. Her recovery after suffering from such serious symptoms could not have been expected. This case may be compared with the one previously related (Case 7). In that case the patient had taken a poisonous dose of opium, and injections of belladonna were employed as a remedial treatment. The quantity of extract of belladonna thus administered amounted to sixteen grains in divided doses over a period of three hours but although the extract was procured from a good source, and was given in large quantity in divided doses, the symptoms indicative of the action of belladonna did not once appear, while those attending the poisonous effects of morphia ran through their ordinary course. In this case, on the other hand, the opium and extract of belladonna were given together, the quantity of opium being equivalent to about four grains. The symptoms were throughout those of poisoning by belladonna only, unchecked in any way by the opium administered with it. In both cases the removal of the residue of the poison was the real cause of recovery.

A serious inquiry presents itself here which may involve a practitioner in legal responsibility. Is it a proper course of practice to prescribe injections of belladonna in *drachm* doses of the extract ? The prescription, I understand, was as follows :

℞ Ext. Belladonnæ, ℥iv ;
Liq. Plumbi, ℥iv ;
Vini Opii, ℥iv.

marked—a fourth part to be used as “a lotion,” night and morning, the term lotion being intentionally used in order to conceal from the druggist the fact that it was intended to be used as an injection. The husband was directed to administer this injection, and after the recovery of the wife so little did the case appear to impress the prescriber as one of any danger, that he is reported to have advised the attendants to inject another dose—an advice which, I believe, was not followed.

Such heroic treatment requires one or two remarks. In the first place, the mucous surface of the rectum appears from recent experiments to absorb poisons more readily than that of the stomach; and secondly, doses of alkaloidal poisons which when administered by the stomach have not destroyed life, have proved fatal when administered by the rectum. These facts should, therefore, convey a warning in apportioning the dose of a powerful alkaloid in an enema. With regard to the extract of belladonna, it is laid down by competent authorities that from one quarter of a grain to one grain and a half is the range of dose by the stomach for an adult not accustomed to the drug. The late Dr. Pereira assigned the dose at from one to five grains, cautiously increased, and observes—“As the strength of the extract is extremely variable, some writers recommend only one quarter or one half of a grain to be given at the commencement of its use, to be repeated three times a day, and the dose to be increased until the well-known effects of the remedy are produced” (*Mat. Med.*, vol. ii, pt. 1, p. 555). Dr. Christison agrees with Dr. Pereira in fixing the dose of a good extract at from one to five grains, but observes that it has not been well determined, and must vary with its quality. Dr. Neligan states the dose to be half a grain, gradually increased to three or four grains.

There can be no doubt that the ordinary extract is liable to great variation in strength. Some samples are almost inert, while others are very active. This explains why it is that in works on toxicology there are various cases recorded in which persons have recovered who had inadvertently taken large doses. Mr. Solly met with an instance in which a person took a scruple by mistake; the usual symptoms appeared in two hours, but under treatment by emetics, the man recovered

the next day. I have elsewhere recorded two cases in which persons have recovered after having taken in each instance one drachm of the extract; but it is pretty certain that the extracts could have contained but little atropia. ('On Poisons,' 2nd ed. p. 828.) This alkaloid is easily affected by a high temperature; hence, unless great care is taken in making the extract, it will lose its active medicinal properties, and will thus fail to act as a poison in large doses.

Still, a practitioner who prescribes *one drachm* of the extract of belladonna at a dose, as an injection, without knowing its strength, incurs a great risk of a charge of manslaughter. The fact that this preparation is occasionally weak, and does not always act poisonously in a large dose, would not be a ground of exculpation; all medicines which notoriously vary in strength, unless the strength is actually known to the prescriber, should be dealt with as if they were strong, and the dose should be kept within the bounds assigned by competent medical authorities.

9. *Effects of a large dose of the extract of Datura Stramonium. Properties of Datura and Atropia contrasted.*

One of my pupils, desirous of trying upon himself the effects of a dose of the extract of datura, swallowed about five or six grains. It seems that he did not at any time become unconscious, but was able to record his feelings and impressions. I think it advisable to give the narrative of the effects in his own words:

"Two hours after having taken the poison my throat began to feel intensely dry, which increased to that state that I could not swallow, and with great difficulty breathe; my tongue felt quite spongy and totally devoid of moisture. The narcotic effects soon became evident, and I reeled as though intoxicated; the pupil of my eye was very dilated (even for thirty-six hours after), and I was at one time nearly blind. I felt very nervous, excited, and irritable, and continually paced up and down my room. The next day I could scarcely see, and was quite unable to read a book when I tried. For three weeks after, I had a very sensible pulsation over my right eye, and even now I seem to feel the effects of the poison in my eyes, my sight

being at times quite dim, although five weeks have elapsed. I was always relieved for a few seconds by imbibing any liquid. The serious effects lasted about eight hours.’’

Remarks.—The symptoms here described correspond to those observed in other cases of poisoning by datura. The medicinal dose is usually represented at one quarter of a grain, but, as in the extract of belladonna, the proportion of the alkaloid may vary. The symptoms, it will be observed, strongly resemble those produced by belladonna; and the alkaloids atropia and daturia are considered to have a similar mode of action, and by some to have an identical chemical constitution. Charpentier has drawn the following conclusions respecting their mode of operation:—When their solutions are dropped into an eye they cause dilatation of the pupil of that eye without affecting the other; they both cause confusion and indistinctness of vision. In poisonous doses, as a result of general absorption, they produce dilatation of the pupils, dryness of the throat, and occasion general disturbance of the functions of the brain, heart, and lungs. He believes that both poisons are strongly influenced in these effects by solutions of opium, especially laudanum, and that this may be regarded as an antidote to the absorbed poison. Both operate as poisons by all the usual channels of absorption, *e.g.* by subcutaneous injection or by the mucous membrane of the stomach and rectum. Neither possesses any cumulative properties, *i.e.* medicinal doses do not so accumulate in the system as to produce symptoms which might not have been foreseen. In reference to either of these alkaloids, it is always by rectal injection that the phenomena of absorption are most rapidly manifested, and at the same time the symptoms have the greatest intensity; after this comes cutaneous injection, and lastly absorption by the stomach. Daturia is more active as a poison than atropia—it is twice as powerful. As differences between the two alkaloids, the results of experiments by the same authority are thus detailed:

Atropia.—1. When dropped into the eye does not produce congestion or inflammation. 2. The dilatation of the pupils does not take place before ten minutes have elapsed, and it may, according to the dose, last for two or three days. 3. The dilata-

tion is sometimes followed by contraction of the pupil, especially when large doses have been employed. 4. Atropia has a slight purgative action. 5. Atropia occasions a temporary cutaneous eruption, somewhat resembling that of scarlatina. 6. In poisonous doses it causes an increase of the pulse and of breathing. In reference to the alimentary canal, it produces vomiting and abdominal pain; while in reference to the nervous system, there is intense headache, attended with violent delirium and great restlessness. There is no effect on the genito-urinary organs. The dose of the neutral sulphate of this alkaloid may be carried to 18 milligrammes ((0·27 grain), *i. e.* rather more than a quarter of a grain, without causing serious symptoms.

Daturia.—1. It dilates the pupils when locally applied more rapidly than atropia, and the dilatation lasts a longer time. 2. The dilatation is never followed by a contracted state of the pupil. 3. A dose of only four milligrammes ($\frac{1}{17}$ th grain) applied to the eye produces in it signs of congestion, with redness and pain. 4. When administered by the stomach, in a dose of seven milligrammes ($\frac{1}{10}$ th grain), serious symptoms are produced. They are distinguished from those of atropia by the fact that they are more intense and less persistent. There is a generally congested state of the skin without any eruption resembling that of scarlatina. The headache is more intense, the pulse is accelerated; there is an uneasy feeling in the region of the heart, with a sense of faintness; noisy delirium, with hallucinations; no action on the bowels, but an excitation of the genital organs (Bouchardat, 'Annuaire de Thérapeutique,' 1864, p. 25). It would appear from these results that, although there are many points in which atropia and daturia resemble each other in their physiological effects, there are sufficient differences to justify us in regarding them as different poisons. From experiments made by the same authority it would appear that hyoscyamia is an alkaloid possessed of physiological properties intermediate between those of atropia and daturia. It dilates the pupil without irritating the eye, produces a calm delirium with hallucinations, and it has a strongly purgative action. It is only one half as powerful as atropia, while daturia has twice the strength of atropia.

10. *What is the fatal dose of Strychnia? Strychnia as a Medicine and as a Poison.*

Toxicologists are accustomed to regard the smallest quantity of a substance which when taken by the stomach has been known to destroy life as the *fatal dose* of that substance, but in reality it implies the smallest quantity which has been carried into the blood by it implies the absorption and has thus destroyed life. That portion which remains under the skin from endermic application, in the rectum from the result of an injection, or in the stomach as a residue of the quantity swallowed, cannot be regarded as operating fatally, and should, in fact, be deducted from the quantity known to have been taken or administered. Nevertheless, for practical purposes, the smallest fatal dose is usually regarded as the smallest quantity which has been swallowed and has caused death. The case of Dr. Warner is commonly quoted as an illustration of the smallest quantity of strychnia which, under circumstances favorable for its operation, may prove fatal to an adult. In this case *half a grain* of the sulphate of strychnia destroyed life in twenty minutes. It had been handed to Dr. Warner by mistake for sulphate of morphia, which he was in the habit of taking. This, however, is a long way removed from the usual medicinal dose, varying from one twentieth to one sixteenth of a grain, and gradually increased according to the effects produced on the muscular system. This is the medicinal dose assigned by Dr. Pereira ('Materia Medica,' vol. ii, pt. 1, p. 655); but Dr. Christison represents the doses of commercial (?) strychnia at from one sixth of a grain to one grain internally ('Dispensatory,' 1848, p. 897). Dr. Neligan gives the commencing dose at one twelfth of a grain, and in the recently published 'Companion to the British Pharmacopœia' by Squire, this is set down as the dose, which is directed to be only gradually and slowly increased. In Dr. Griffith's 'Universal Formulary' the medicinal dose is stated to be from one sixteenth to one tenth of a grain at first, carefully watching the effects, and only slowly increasing the dose accordingly. Another good authority describes the commencing medicinal dose as from one sixteenth to one eighth of a grain, which may be gradually

increased until a grain is taken (Dungleson's 'New Remedies,' p. 664).

If we except the statement of Dr. Christison (published in 1848), any dose above one eighth of a grain, given to an adult, may operate as a poison, and not as a medicine. It may be expected to produce those symptoms, affecting the nervous and muscular systems, which for the purpose of a medicinal action it is desirable to avoid. Most practitioners would, I believe, shrink from commencing with so large a dose as one sixth of a grain. A dose of one twelfth of a grain has been known to produce tetanic rigidity in a paralysed limb. A gentleman took medicinally one twentieth of a grain of strychnia, in six doses, during a period of two or three days. Severe fits of tetanus followed, although half a grain had not been taken altogether. In May, 1859, Dr. Tweedie informed me of a case in which he had prescribed for an adult patient, pills, each containing one fifteenth of a grain of strychnia. He took altogether five pills, or one third of a grain, at proper intervals. This patient was seized with the most alarming tetanic convulsions, lasting for some time. There was also opisthotonos in a severe form. He had a narrow escape of his life, and only slowly recovered from the effects.

In two cases of adults a quarter of a grain was taken by each, and the patients recovered only under early treatment ('Lancet,' July 26th, 1856, pp. 107, 117). From these facts, therefore, it may be inferred that while a medicinal dose of pure strychnia does not go beyond the eighth of a grain, a poisonous dose commences at about one fourth of a grain.

In a case in which I was consulted in November, 1864, an action was brought by a gentleman against a druggist for alleged injury to health done to him by a mistake in compounding a prescription. The prescription, written by a regular medical practitioner, was for a solution of strychnia in the proportion of half a grain of the alkaloid to eight ounces. A table-spoonful was ordered to be taken at a dose. This dose was taken, and it is said to have produced very powerful effects, *e. g.* tetanic spasms and other unpleasant symptoms, but at no time was life in danger. These effects, however, led to an analysis of the liquid, and it was then found to contain strychnia in the proportion of about one fifth of a grain to the ounce,

instead of one sixteenth of a grain as prescribed, so that there was a great probability that a grain and a half had been put into the original mixture in place of half a grain. In an experiment which I performed on a portion of the mixture half an ounce gave one tenth of a grain, making 1·6 grain of strychnia for the eight-ounce mixture. The question, therefore, was, what quantity of strychnia had plaintiff taken, and what damage or injury to health had he sustained by it?

A table-spoonful was prescribed for a dose. This is at all times a vague measure for doses of powerful medicines, for I find it may represent from five to eight fluid-drachms, according to the level to which it is filled, but more commonly it is equivalent to six drachms. As I am informed, the plaintiff took an ounce of the mixture, and in this case he would have swallowed the one fifth of a grain. The alleged damage to the health of the plaintiff by such a dose, whatever it might have been in the first instance, had left no permanent injury when I saw him, some months afterwards, but the defendant, dreading an exposure of the mistake made in dispensing the medicine, compromised the matter by paying down a large sum of money. It is to be regretted that the case did not go to trial; the mistake was not of so serious a nature as represented, and it might, perhaps, have turned out that the quantity of strychnia taken in the form of a table-spoonful was larger than had been intended by the prescriber.

It follows from the facts and observations in this paper that, so far as the question relates to adults, strychnia may operate medicinally in doses up to one eighth of a grain. In the case above related one fifth of a grain was taken, and it was followed by some symptoms indicative of a poisonous operation, but from which the person recovered. In two cases life has been endangered by one fourth of a grain, and in one case by one third of a grain, although given in five separate doses, at the usual intervals. In two instances half a grain, taken at a dose, has proved fatal to life. In reference to *sex*, I am not aware of any facts which show that this alkaloid is more potent to females than to males; but *age* necessarily exerts an important influence. A dose which acts only as a beneficial medicine to an adult man, operates as a poison to a child. Dr. Christison communicated to me a case in which only one

sixteenth part of a grain of strychnia (a medicinal dose, in the form of pills, for an adult) destroyed the life of a child between two and three years of age in four hours. These results render it difficult to define a poison, or to place an accurate boundary between the same substance acting poisonously and medicinally. Strychnia is a poison or a medicine according to the dose in which it is administered, and the age of the person to whom it is administered.

Since these remarks were written a case has occurred showing the importance of drawing a distinction between poisonous and medicinal doses of strychnia. A young lady was seized with the usual symptoms produced by strychnia in about half an hour or three quarters of an hour after she had taken three pills prescribed for her by a medical man. Some of the pills which remained were examined, and it was found that three weighing 12·6 grains contained half a grain of strychnia. The symptoms came on, as usual, very suddenly; there were tetanic convulsions, with-lock jaw and opisthotonos, and in two hours after the symptoms commenced, she died. Had a medicinal or poisonous dose been taken in this case? An extract made of one pill and a half introduced into a wound in the neck of a rabbit produced tetanic symptoms in four minutes, and the animal died in three minutes more. The quantity of strychnia used in this experiment was considered to be equivalent to one quarter of a grain. There was no doubt that the three pills had caused death, and that the strychnia contained in them was sufficient to produce a poisonous and not a medicinal action. It was further stated that one of the pills (= one sixth of a grain of strychnia) might produce symptoms of poisoning, but would not be likely to prove fatal to an adult; that two pills might place life in jeopardy; and that three pills, containing half a grain of strychnia, if taken at once, would be sufficient to destroy an adult.

Strychnia does not appear to accumulate in the body, but when taken for a long time in medicinal doses it is either decomposed or eliminated. In the following case, which occurred under Dr. Rees, an adult took the one twentieth of a grain of strychnia, three times a day, for twenty-nine days.

This made rather less than the one seventh of a grain daily, or $4\frac{7}{8}$ grains for the whole period. I subjoin a report of the case, as drawn up by Mr. B. Duke.

Ann E. E—, æt. 52, under Dr. G. O. Rees, was admitted October 12th, 1864, suffering with chronic rheumatic gout. She has enlargement of the finger- and knee-joints, which are painful and tender; appetite not good; pulse 98 per minute; heart-sounds normal; bowels well open.

October 13th.—Ordered—

Strychnia, gr. j;
Acid. Sulph. dil., ℥x;
Tinct. Cardam. co., ℥j;
Aquæ destillatæ, a. ℥x. Cap. ʒss ter die.

14th.—Had a bad, restless night after the second dose; she had slight numbness of lower jaw, but was not cold.

16th.—Ordered to take only a dessert-spoonful for a dose.

18th.—As she felt no numbness after taking a dessert-spoonful, was ordered to take a table-spoonful. She feels better, her joints do not smart so much, bowels confined.

20th.—Had shooting pains extending from left hip down the thigh, and had slight jumping of the leg; she complains that her legs feel very heavy.

29th.—Feels a great deal better.

Nov. 8th.—Has more pain in the knee-joints, otherwise doing well.

11th.—States that at night after she has been to sleep her legs feel very heavy; when attempting to turn over she has great numbness of the lower extremities; she feels better, and her joints are less swollen.

Throughout the treatment there were no indications of the poisonous operation of the alkaloid, although during the month the woman had taken a sufficient quantity of strychnia to destroy nine adults.

In the latter stage of the case an experiment was made upon the urine of this patient. Twenty-four ounces were evaporated to dryness in a water bath, and the residue was treated in the usual way for the detection of strychnia, but there was no trace of that alkaloid on applying the usual tests. Either the urine did not contain any, or the proportion was too small to admit of detection. The small quantity of strychnia taken in divided doses—one seventh of a grain in a day—even if it were assumed that the whole were eliminated in twenty-four ounces of urine, would form but a very minute proportion; it would be less than one eighty-thousandth part of the urine. The channels by which this alkaloid is elimi-

nated are not known, but the urine is only one of them, and, except when strychnia is given in such quantities as to produce a poisonous action on the body, it is not probable that it will be found.

CLINICAL LECTURES,
DELIVERED AT GUY'S HOSPITAL, DURING THE
WINTER SESSION, 1864-5.

By JOHN HILTON, F.R.S.,

Arranged for publication by GEORGE EASTES,* *from notes taken by himself and*
HENRY DENNE.*

LECTURE I.

Fractured clavicle ; shortening ; great displacement backwards of outer fragment ; pressure on nerves of brachial plexus ; paralysis of certain muscles, and partial loss of sensation in the arm.

J. M—, æt. 29, admitted into Cornelius Ward, under Mr. Hilton, on October 17th, 1864.

Forty-two hours before admission a lump of earth fell from a height of twelve or fifteen feet, and struck him, whilst working in the pit of a new railway tunnel, on the point of the left shoulder. He was attended by a surgeon who could not make out exactly the whereabouts of the fragments of the broken clavicle, and so sent the patient to the hospital.

On admission (second day after accident), the left clavicle is found fractured at about its middle ; the inner fragment is drawn upwards, the point of the bone being very prominent ; the outer fragment cannot at first be discovered.

Chloroform is administered ; the shoulder thrust backwards, and then the outer piece comes into very good position. A pad is placed within the left axilla ; left arm fixed to side of chest ;

* Mr. Hilton's dressers.

and left forearm and hand bandaged tightly across front of chest. By these means a good position of the fragments (after two failures) is attained. The left hand is made to touch the opposite shoulder; and the left elbow is kept elevated and brought forward by a strap which also passes over the right shoulder, and is then fixed behind.

October, 20th (fifth-day).—Mr. Hilton does not quite approve of the above method, because the chest is much confined by it, and an apparatus of the following description is ordered to be applied. Two handkerchiefs to be provided; one to be passed around each shoulder, embracing the acromion and head of the humerus, traversing the axilla, and then tied. A bandage is next to be passed across the scapulæ from the loop of one handkerchief to the loop of the other, so as to draw the handkerchiefs together behind, and thus thrust backwards the points of the shoulders. But in the present case it is found that this cannot be done without great displacement of the outer fragment of the broken clavicle, so recourse is again had to the method adopted on the patient's admission. The outer fragment, however, having been allowed to become displaced cannot be raised again into so good a position as it had on the 17th instant.

Sixth day.—Left hand feels numb. The outer fragment of the clavicle is much depressed.

Tenth day.—A great amount of effusion has taken place around the fractured portion of the bone.

Sixteenth day.—Some of the muscles of the left hand are paralysed, and sensation down the left arm is interfered with.

Thirty-third day.—Mr. Eastes reports thus—"Measuring from the inner extremity of the clavicle to the tip of the acromion on the injured side, and then on the sound one, three-quarters of an inch of shortening is found in the fractured clavicle.

Three distinct sets of nerve symptoms are to be met with in the left arm; these are *pain*, *loss of sensation*, and *loss of motion*.

Pain is felt along the inner margin of the little finger and hand, and in the course of the trunk of the ulnar nerve up to the axilla; it is most severe just behind the inner condyle of the humerus, where the articular twigs to the elbow-joint

come off from the ulnar. No pain is experienced in the course of any other nerve.

Loss of sensation.—Upon marking the arm with ink all around with the figures 1, 2, and 3, according as sensation is perfect or not, it is found that, if the cords of the brachial plexus are selected, and the distribution of the cutaneous nerves of each traced out on the skin, they are functionally deranged in the manner stated below; and this seems to hold good for each nerve. First, with regard to the cutaneous nerves given off from the inner cord—viz., the internal cutaneous, nerve of Wrisberg, and ulnar—these are the most interfered with of all the cutaneous nerves of the arm. The nerves of the posterior cord—viz., the radio-spiral, and circumflex,—and the musculo-cutaneous (a branch of the external cord)—do not convey perfect sensation, but yet their functions are not so much deranged, as in the case of the nerves coming off from the inner cord. Part of the median nerve—viz., those branches supplying the digits—conveys but very slight centripetal impulses; whilst the palmar branch of the same nerve is capable of much more facile transmission. Does this indicate that in this case the digital branches come from that portion supplied by the inner cord of the plexus, whilst the palmar branch comes from the offset derived from the outer cord?

Loss of motion.—All the muscles, from the deltoid downwards, are much diminished in size. The forearm can be flexed and extended on the arm. The hand can be flexed and extended on the forearm; and the hand can be pronated and supinated. But all these motions are performed with much less facility than in the healthy limb. In these cases it is found impossible to isolate the action of each muscle from that of its neighbours; but in the hand the appreciation of each muscle's action is comparatively easy of accomplishment. Those muscles of the hand supplied by the median nerve are quite paralysed; those supplied by the ulnar only slightly so. Thus, the thumb can only be adducted (adduction being performed by adductor pollicis muscle, which is supplied by the ulnar nerve). The forefinger enjoys no motion at all; the middle finger can be flexed slightly, and the ring and little-fingers considerably—is this because the outer half of the flexor profundus digitorum is supplied by the anterior in-

terosseous, a branch of the median, the inner half by the ulnar? The patient can flex no finger at the metacarpo-phalangeal joint—is this because the motion at this joint is principally caused by the flexor sublimis, which is supplied by the median? The fingers altogether are gradually assuming a flexed state as their usual position.

Forty-fourth day.—Pain still exists in the course of the ulnar nerve; there is now also a pain in the palm of the hand over the heads of the metacarpal bones. The skin supplied by nerves derived from the outer cord now transmits sensitive impressions normally; and the skin supplied by nerves derived from the inner cord has its sensibility much improved. The thumb can be slightly flexed, also the fore-finger; but the motions of the thumb requiring the opponens pollicis muscle (supplied by the median nerve) cannot be performed. The motions of the three inner fingers are improved, as far as flexion and extension are concerned, they also flex and extend at the metacarpo-phalangeal joint. But it appears that the increased flexion of the fingers is due to a better action of the flexor profundus (which is partly supplied by the ulnar), for he cannot bring into action the flexor sublimis alone without the flexor profundus. For instance, he finds it impossible to flex the fingers at the metacarpo-phalangeal and first phalangeal joints only (these motions being performed by the flexor sublimis) without flexing the last phalanges (this being done by the flexor profundus). The interossei muscles act only to a very slight extent: yet they are supplied by the ulnar nerve. The radial side of the index finger has its sensation much diminished; why so? Thus, then the ulnar nerve is found paralysed, as far as sensation is concerned, more than the median; whilst (supposing the above account of the actions of the muscles supplying the fingers to be correct) it is evident that the ulnar conveys centrifugal impulses much the better of the two. Is this possible?

Forty-ninth day.—The tumefaction at the site of the fracture is less; but the symptoms down the arm remain as when last reported. The radial artery of the left wrist is smaller than that on the right side."

P.S.—April 3rd, 1865.—Owing to some non-compliance with the ward regulations the patient was peremptorily dis-

missed on December 18th. He has not since presented himself at the hospital.

GENTLEMEN,—In commencing my portion of the lectures on Clinical Surgery, I think a few remarks are required from me concerning the manner in which I propose to deal with our subjects. I entertain the opinion that the best plan to pursue in a clinical lecture is to take up one case, to enter fully into all the details of the symptoms and treatment of it, and to explain to you, to the best of my ability, the why and the wherefore of everything associated with that single case. Some surgeons prefer adducing a number of different cases, making a few leading remarks on each, until the hour is expired. I consider my analytical plan to be productive of the greater benefit to you, gentlemen, by inducing you to habitually examine and to try to interpret every symptom presenting itself to your notice; and as I see no reason to warrant departure from my established custom, I shall again adopt the rule by which I have been guided in former winters.

The case before us to-day is an instance of fractured clavicle, resulting in shortening and displacement, accompanied with peculiar nervous symptoms the result of pressure of the displaced fragments upon the axillary plexus of nerves. The outer portion of the clavicle was thrust downwards at first by the fall of the lump of earth which caused the original injury, and subsequently the displacement was sustained by muscular contraction and gravitation, in the following manner. The inner portion of the fractured bone was raised by the sternomastoid muscle, whilst the outer fragment was driven backwards into the posterior triangle of the neck, and carried downwards by the weight of the arm, which depressed the point of the shoulder; and the persistent displacement was aided by the contraction of the subclavius muscle attached as far as the coraco-clavicular ligaments, and by the pectoralis minor pulling down the coracoid process of the scapula to which the clavicle is attached. The outer fragment was further drawn backwards by the trapezius. The conditions that I have enumerated as causing the displacement in this instance are those which usually obtain in fractured clavicle. The object of treatment in all such cases is purely mechanical;

you have to reduce the fracture, or readjust the fractured ends of the bone, and when replaced in their right relative position, maintain them in that state. How were these indications to be here fulfilled? The outer fragment was depressed and drawn backwards, and the point of the shoulder fallen in towards the middle line, so that the outer portion came to lie behind the inner end, and thus the bone was shortened. The treatment was intended to correct all this deformity. Some apparatus had to be used which would force backwards the point of the shoulder in order to extend the broken bone. Various means may be applied in order to secure extension; and I have oftentimes found that this object may be accomplished by the employment of two handkerchiefs, in the way mentioned by the dresser. At the same time, it was necessary to keep the shoulder outwards, in order further to prevent the sinking of the external fragment and the consequent shortening; nothing is usually so efficacious to this end as the pad in the axilla. Lastly, the weight of the arm, which caused the dropping of the shoulder, had to be counteracted. Pressure from below upwards at the elbow, as by a wide sling embracing all the forearm with the elbow (which latter point is essential), is all that is usually required to effect this purpose.

No one apparatus, however, is suitable in every case of fractured clavicle, and that surgeon will best succeed who competes with each case according to its own peculiarities. Each of you must reason with yourself as to what mechanism seems most likely to suit each particular instance; but, if you find you cannot bring the fractured portions into good position and retain them by one kind of appliance, you must make use of another. I will now introduce the patient to your notice, in order that you may obtain a view of the mode according to which you may assist nature in repairing a fracture of the clavicle, and that you may also see the plan upon which the dresser treated the injury in this case. I like to interfere as little as possible with the respiratory movements, in order that nothing may tend to thwart or disturb nature's attempts at repair; hence the chest should not, if avoidable, be tightly bandaged round and round. But the handkerchief plan could not be made to answer here, so the dresser very properly applied the same apparatus as he had used with

success, as regards the fracture, at the period of the man's admission, and to which I had objected on the ground that it caused the patient to breathe with difficulty.

I think this must have been a case of comminuted fracture (like this dried specimen in our collection to which I am now pointing), and that the third piece was impacted or wedged in by the original blow on the shoulder. Hence, probably arose the difficulty which was experienced, from the first, in replacing the fragments. They could not be coaxed into very good position, and the mal-position seems to have been increased, when on the fifth day, at my suggestion, the fracture was disturbed. Had I seen the case on admission, and recognised its severity, I should have rested satisfied with what was accomplished by the house-surgeon and dresser, and should not have subsequently ordered any alterations to be made. At any rate, the report of the case for October 20th, well illustrates the maxim of "Let well alone." Depend upon it, it is a good adage, "Meddlesome surgery is bad surgery;" and, therefore, the advice I give you is—when you have to treat a bad fracture, use every means in your power, and as early as possible, to replace the fragments in their normal situation, and do not rest satisfied with your efforts until assured that no other method is more suited to the case in question, than that which you have adopted. But, having once done this, do not change your plan, unless absolutely compelled, for you may be quite certain that no good will result to the patient from frequent change of splints, bandages, &c.

Now we come to discuss those different nervous symptoms in the left arm which form so distinctive a feature in the present case. You will perceive that, on the day succeeding the second manipulation, that is the sixth after the accident, the patient complained of numbness in the left hand. Four days after that, and the tenth day after the accident, when a report was again taken, a large swelling was noticed at the seat of fracture; it was probably there when the man first complained of the numbness, although no notice of it was taken until the tenth day after the accident. Now the numbness was no doubt due to pressure on the nerves of the brachial plexus, which pressure was the mere mechanical effect of the swelling. Was the swelling caused by callus? I think

not, seeing that the callus of fractured clavicle does not begin to form before the sixth or seventh day at the earliest. If my supposition of the numbness on the sixth day being due to a swelling at the site of fracture be correct, then that swelling was probably due to extravasation of blood, serum, and lymph, in the neighbourhood of the fracture, seeing that it ensued too soon after the accident, and existed in too large a quantity to be callus. Afterwards, as this extravasation became cleared up, the brachial plexus of nerves was pressed upon by the callus thrown out around the fractured portions of the bone. Callus is nature's splint, serving to retain in position the broken pieces, consequently the amount of callus thrown out is in direct proportion to the amount of displacement, or of disturbance of the broken ends; with the greater mutilation is associated the more extensive callus, and *vice versa*. I have no doubt that herein lies the cause of the callus becoming so massive. I shall not trouble you with any very minute anatomy respecting the peculiar nervous symptoms manifested in this man's arm; but I will read over slowly the dresser's report of the case, and then I will intersperse a few remarks, where such seem to be required. There is the patient before you; I will ask him to show us what he can, and what he cannot, do with his arm. I ask him to point out the painful region of the limb, and the pain is evidently expressed in the course of the ulnar nerve. The greatest pain is at the back of the inner condyle of the humerus, and is probably expressed in some articular twigs which are there given off from the trunk of the ulnar to the inner part of the elbow-joint. With regard to the query, which the dresser raises, in respect to the point of origin of the different centripetal parts of the median nerve, I am unable to furnish a solution; for I am not aware that the origin he suggests has ever been traced. Concerning the distribution of nerves to the muscles of the arm and forearm, I will give you a hint or two, a sort of anatomical epitome, that may, perhaps, be of service. All the extensors of the elbow-joint, of the wrist-joint, of the thumb and fingers, are supplied by the radio-spiral nerve. The flexor muscles of the elbow-joint are supplied by the musculo-cutaneous nerve, and part of median nerve. The flexors of the wrist-joint by the median and ulnar

nerves together. The hand is altogether pronated by means of the median nerve. The hand is supinated by the radio-spiral. All those muscles by which the hand is enabled to be clenched into the form of the fist, viz., all the muscles of the little finger, the interossei, the abductor indicis, the adductor pollicis, and the inner half of the flexor brevis pollicis, are supplied by the ulnar nerve. Concerning the next query, whether it is possible for one nerve to convey sensory impressions better than another, and yet for the muscular impulses of the former to be weaker than those conveyed by the latter, I cannot say. My own impression, however, is that such cannot be; yet, here is the man, he will show you what he can do with his hand, and that seems to correspond accurately with the statement contained in the report. You cannot fail to perceive how all the muscles of the patient's left arm are wasted. This is owing to the deficient nervous supply which they now receive; for undoubtedly, the nutrition of the muscles is effected in some mysterious way by the nerves distributed to them, as well as by the arteries which convey the blood (vide Lecture V). The proof of this statement lies in the fact, that muscles will waste from mere disuse (as seen in cases of joint disease), but not so rapidly as when the nervous supply is cut off. Thus it comes to pass, that nerves constitute not only the medium for sensation and motion, but that they contribute also directly to nutrition, and to the maintenance of the size and fulness of muscles.

The prognosis in this case is favorable as regards the recovery of function by the nerves; for the report on November 28th, distinctly states that the paralysis both of sensation and of motion in the left arm is less; and on December 3rd, the tumefaction at the clavicle is diminished. Putting together these two paragraphs, and further judging by what we know takes place in all cases of this description, we must conclude that much of the callus of the broken bone is being absorbed, and that consequently the pressure on the nerves of the brachial plexus is being gradually removed. In time, probably, the nerves of the arm will fully regain their functional power. Still, however, we must remember that the left clavicle is shortened by about three quarters of an inch; which cir-

cumstance will certainly reduce the efficiency of the left shoulder.

I will now dismiss the patient, and pass from the consideration of his especial case to the discussion of some general matters connected with fractured clavicle. This, like other bones, may be broken both by direct and by indirect violence. A very frequent history attached to a case is, that the patient was falling and put out his open hand to save himself. The forearm being then fully extended on the upper arm, the patient's wrist came into contact with the ground; the effect of the sudden arrest of motion there experienced being transmitted at once by the humerus to the scapula and scapulo-clavicular ligaments, thence through the acromion and clavicle to the sternum and to the rest of the trunk. Now the clavicle yields a good deal, but still not enough to arrest completely the momentum of the patient's falling body; the collar bone, through which passes all the strain, consequently gives way, or in other words, is broken. When so produced, the fracture is at about the middle convex portion of the bone, which is its smallest but densest and strongest part, and is moreover the spot where the curves of the inner and outer half meet. I have cited these conditions as associated with a fracture produced by indirect violence. When fracture occurs from direct violence, as by the kick of a horse, or from the fall of a heavy weight upon the shoulder (as in the case of the man I have just sent away), the bone may be broken at any spot; and the fracture is much more liable to be of the comminuted variety than when the injury is the result of indirect—that is, of transmitted—violence. The reparative powers of the clavicle are very great; it has numerous small arteries entering it from the periosteum, as well as a large nutritious artery, passing directly to its interior. An ununited fracture of this bone is consequently very rare, and a delayed union of the fractured ends is of exceptional occurrence. No doubt the natural provision for a speedy reparation of this bone, owes its significance to the important aid which it contributes towards respiration, an animal-life function highly important. The same reason also obtains in the case of the ribs; hence they are admirably well nourished with arterial blood, and consequently possess good reparative powers. The functions of the clavicle are especially

important in regard to respiration, since to it are attached some of the principal respiratory muscles. For this reason, ossification commences in it as soon as in any other bone, if not before it is observed in any other bone of the foetus; and at birth, the clavicle is almost entirely ossified, so that the child may then live by its own special respiratory efforts. The muscles attached to the clavicle enable the child to take a deep inspiration. Having done this, it can cry, &c., and so inform others if it be pleased, or in want, or in pain; without which intimations its extra-uterine existence might be of doubtful duration. Furthermore, the clavicle is developed thus early in relation to the movements of the upper extremity, and to the position of the shoulder-joint at the lateral aspect of the body. In consequence of the situation of the glenoid cavity of the scapula, at the middle of the lateral aspect of the trunk, the hand is enabled to touch every part of the body. The clavicle supports the scapula, and keeps it in its place over the arches of the true ribs—architecturally the strongest parts of those bones. It thus provides for or permits the free normal mobility of the anterior part of the thorax; or at any rate, it prevents that motion from being encumbered by the scapula or upper extremity. Deterioration of consentaneous development in the young in all these several directions, is consequently produced by fracture of the clavicle; so that the management of a child's collar bone when broken becomes of great importance. Should perchance the fracture be badly treated, permitting much displacement of the broken ends, and consequent shortening of the whole bone in a young growing subject, the other parts on the same side with which it is in relation—as the thorax and upper extremity—have their full development interfered with. I have seen several cases of this sort, and deplorable are the results when the unfortunate patient arrives at adult age. The shoulder on the injured side is lower than the other, so that, if the sufferer be a female, a low evening dress cannot be worn. The arm and the walls of the corresponding half of the thorax, are not fully developed. The same lung cannot, therefore, normally expand, and the blood not being properly aerated, the whole body suffers in that respect. A greater than the normal strain is thrown upon the right ventricle of the heart, and in process of time cardiac disease may be actually

produced from a badly managed fracture of the clavicle. If you bear these observations in mind, I am sure you will henceforth be very careful how you treat a fractured clavicle in very young growing patients.

The prognosis of fractured clavicle is widely different at the opposite periods of life. If it occur in the young and healthy it will quickly unite, and in a few days no harm seems to belong to it, provided you maintain the bones quiet and in good position. In an old, or a bronchitic, or an asthmatic man, however, the prognosis is very bad ; for he is likely to be in his grave in ten days or a fortnight. He requires to use his clavicle for respiration ; but as the bone is broken, the respiratory muscles attached to it cannot act ; the corresponding lung becomes insufficiently aerated ; blood accumulates in it ; bronchitis is set up ; and death not unfrequently results. Similarly, if a young person with fractured clavicle get a pneumonia, he being unable to expectorate and to clear out his lungs, in consequence of the broken bone, the prognosis becomes much more serious than when no such bone-fracture complication is present.

LECTURE II.

Concussion of brain ; depression of bone.

C. D—, æt. 11, living in Kent Street, Borough, on Monday evening, December 5th, 1864, whilst walking backwards, fell a distance of six feet through the open door of a cellar, striking the left side of his head upon the stone floor without producing any external wound. He was taken up insensible ; continued sleeping during the whole of Monday and Tuesday, was roused with difficulty, but was not absolutely unconscious. He vomited soon after the accident on Monday ; repeatedly on Tuesday ; and three times on Wednesday morning, before he came into Guy's at 11 a.m. ; the vomited matters were green and bitter (bilious). Has not passed his motions involuntarily ; micturition is very slowly accomplished, and with difficulty. There have been neither convulsions nor rigors. He has been attended by a medical

man, who has administered medicines ; all of which, however, have been quickly vomited by the patient. Bowels have not been relieved since Saturday last.

On admission, being put to bed, he lies curled up asleep, on his right side ; but is perfectly conscious, for he can be easily aroused. Over the left parietal bone is a large diffused fluctuating swelling, which is bordered by a firm rim. In some parts this rim is undoubtedly fibrine, for it goes away when persistent pressure is applied to it ; but near the antero-inferior angle of the parietal bone there is a hollow, with an unyielding border or rim, which Mr. Hilton thinks due to depressed bone. No paralysis. Pupils natural. Ordered Pulv. Rhei c. Hydrarg., gr. xij, statim sumend. Ice to be applied to the head. Milk diet.

December 8th.—No sickness. He still sleeps a great deal. Ordered, Hyd. c. Cret., gr. ij ; Pulv. Dover., gr. j, ter die sumend.

9th.—Tumour less ; the rim and depression more distinct. Bowels acted once yesterday.

10th.—Milk diet to be continued.

No cerebral symptoms ; health good. Extravasated fluid ; not less in quantity, but more distributed.

beef-tea, half-a-pint to a pint ; its effect on the case watched.

The progress of the case subsequent to the lecture :—The boy having no indications of fever, his diet was gradually improved. During the first week it was thought right in relation to his cerebral inflammation to keep the boy on low diet, there was scarcely any absorption of the extravasated blood, but, as soon as he was able to eat daily, and his general health thereby invigorated, the fluid blood became rapidly absorbed, but also a fibrinous deposit around the fluid, and by which the latter was contained and absorbed, disappeared. This fact points to a principle of successful treatment quite in accordance with experience, viz., that if it is desired to obtain absorption of deposits from chronic disease, or of those which are the immediate consequence of acute disease, the general health must be kept up. Upon this therapeutical principle I lay great stress.

The patient went out on January 4th, and has since on two or three occasions presented himself at the hospital for observation by Mr. Hilton. The depressed portion of bone has been raised nearly to its normal level, and the planes of bone on either side of the line of fracture have gradually become bevelled off into one another by a new layer of osseous tissue.

GENTLEMEN,—This case of injury to the head has been in my ward during the last nine days; it is a simple, but in some respects an exceedingly interesting case. I have selected it for lecture to-day, as it seems to offer some points well worthy of your careful consideration.

The patient—a boy of eleven years of age—fell through a trap-door a distance of about six feet, struck his head, and was brought to the hospital two days subsequently. When I first examined his skull, I found a large swelling over the left parietal bone, and was rather undecided as to its nature; but at length, for various reasons, which I will presently detail, I concluded it to be occasioned by effusion of blood, &c., covering a portion of depressed bone, in fact, a fracture of the skull. Bearing this point in view, you will bring to your mind the weight that is attached to the fact that there was no external wound at the part; or, to state it emphatically, he had a simple and not a compound fracture. The importance of this can be scarcely over-estimated, considering how much more tedious and exhausting is the recovery from a compound fracture (during which the portions of fractured bone and the lacerated soft tissues heal by a slow process of suppuration), than from a simple fracture, which is healed through the medium of a minute callus only. Besides, in compound fracture of the skull there is the liability of the spread of inflammation and of suppuration from the external wound through the cleft of fracture to the membranes lining the skull, and in this further way the accident may prove fatal. This boy was suffering, on admission, from concussion of the brain, and not from compression. Even though there apparently be unconsciousness in concussion, still you then have a power of arousing the brain, as was done in this boy's case; but you cannot so influence the brain which has suffered sufficient structural

injury as to cause symptoms of compression, that is, you cannot then awaken the patient from his state of unconsciousness. In concussion, the breathing is not usually noisy nor stertorous, as it is in compression. Stertorous breathing depends on pressure upon the medulla oblongata, and the nerves attached to it, and which regulate and maintain the consentaneous action of the muscles of the larynx, pharynx, and soft palate; the palate is then blown to and fro by every breath taken in or sent out, and, whilst thus paralysed, its vibrations cause the noise denominated "stertorous breathing." In arousing the patient, do not rest satisfied with simply asking the patient how he feels, or how his accident arose. If you merely speak to him, calling him by his name, he will not answer you; but if you pinch and pull his nose, and he has within even the minimum of consciousness, he will recognise that act as an indignity, and will endeavour to resent the insult, or will flinch, or turn himself in bed. Moreover, learn from some of his friends the Christian name by which he is usually accosted; and then shout in his ear your questions, addressing him first of all by the term most familiar to him—as Jack, Bob, Bill, or whatever it may be. If conscious, he will then reply to your queries. The boy continued sleeping; that was no reason why there should be structural cerebral lesion of any importance, sleep being undoubtedly the natural restorative of a brain which has been shaken. Hence, by all means let the brain suffering from concussion sleep, just as you keep at rest an injured joint. No structural lesion of the brain is recognised in the state which is called concussion; the pathological anatomy of this condition is unknown. Some have supposed it to be due to a disturbed state of the cerebral circulation; but I cannot understand how the circulation can remain so disturbed for ten days or more, and then get well; and yet men suffering from concussion will remain for so long in a state of semi-unconsciousness, only becoming temporarily intelligible when thoroughly aroused, and then quickly relapsing into apparent insensibility.

This boy had occasional vomiting, after the accident, during three days, when it ceased. Had the vomiting persisted, exploration at the site of the depressed bone might have been necessary, to see what injury had been inflicted on the skull.

But an efficient purgative having been given on the boy's admission, the vomiting ceased ; therefore, perhaps it depended only on a loaded state of the bowels, which had not been relieved for four days. The boy lay coiled up in bed, indicating that he still had a sense of personal comfort : in other words, that the brain was conscious. In cases of injuries to the head, I like to see a patient with the bed-clothes drawn up over his head, and his head tucked in, away from all noise and disturbance of every description, and who replaces the clothes as soon as you disturb them. I argue that he will do well, or rather, perhaps, I should say, the injury suffered by his brain is not very severe. I remember once being called to see the son of a merchant. He and the three medical attendants were in great anxiety about the patient, who had injured his head by falling in a warehouse, through three sets of trap-doors, left open in as many floors, and who had been taken home unconscious. Upon my going into the bed-room I observed that he was conscious, and lying curled up in bed ; I expressed off-hand a favorable prognosis as regarded his brain, without even having looked at his head, stating to the surgeons the reasoning I have adduced to you.

When a blow, as by a hammer, is made on the scalp, blood is extravasated at that part, causing an elevation. The blood coagulates around the spot upon which the hammer struck, so that the elevation resolves itself into a central hollow of fluid serum, and a surrounding elevated ring of solid fibrine, giving rise to a sensation of depressed bone in the centre. If, however, you press firmly for a minute or two with your finger on the annular elevation, and it be simply blood and fibrine, it will gradually depart, and you then feel the bone in the centre of the swelling, evidently on the same level as that of the surrounding bone ; there is evidently no central depression. In the case of this boy, most of the elevation could be got rid of by means of persistent pressure with the finger ; but there remained a depressed portion near the anterior border and the inferior angle of the left parietal bone. Mr. Cock and myself concluded this to be a portion of depressed bone.

The little patient had no paralysis at any part of the body ; always a good sign in injuries of the nervous centres. The pupils were natural, contracting under the stimulus of light.

If the size of the pupil is variable—if, in fact, under the stimulus of light the pupillary aperture vary, the condition giving rise to this variability must also itself be variable and varying, and there cannot, in such a case, be any local lesion. If one pupillary aperture be variable and the other fixed—no matter whether dilated or contracted, so that it is fixed—you are dealing with a serious case, for the cause of the fixed pupil is persistent, and the direct consequence of accident; the cause may be laceration of brain, injury to nerve, extravasation of blood, or depressed bone.

Some years since, I was one day sent for to see a young gentleman who had been knocked down in the street, by a dog running against him: he fell with his head upon the pavement; he had severe concussion of the brain; one pupil was slightly acted upon by light, the other was perfectly dilated and immovably fixed. I observed that the boy would probably recover, but I thought that he would remain blind with the eye with the fixed and dilated pupil. The boy is still perfectly sightless in that eye. I remember a somewhat ridiculous instance of the association of a fixed pupil with injury to the head. A gentleman received a very severe injury to his head, and subsequently progressed well, in every respect, except as regarded his fixed pupil. His medical attendants, however, were puzzled to account for the fact that the pupil remained always contracted, and it became a matter of some anxiety to them. The butler, an intelligent man, noticed that they wheeled his master daily to the window, and examined his eyes, in order to observe the effects of light upon them, at last he said, "Doctors, you will excuse me, but, perhaps, you are not aware that master's got a glass eye."

As is my usual practice, in cases of severe injury, I gave this boy mercury and chalk, with a little Dover's powder. This combination seems to prevent the occurrence of inflammatory action after accidents; by giving it, you also avoid nervous irritation, and I venture to express the opinion, that its employment tends to the prevention of tetanus. I make this observation to you, and act in accordance with it in practice, and, I believe, with very great advantage to the patients—it is the result of clinical experience. The explanation of this, perhaps, is, that tetanus may possibly be due to inflam-

mation extending along an injured nerve to the spinal cord, which inflammation is prevented by the combination I have indicated. *Ice* was applied to this boy's head for two purposes. First, to prevent inflammatory action; that is, to prevent so much inflammation arising as would kill the extravasated blood, for if such an occurrence do take place, the dead blood becomes an extraneous body and leads to suppuration, or, if absorbed, may lead to pyæmia. Secondly, by the use of ice we hoped to limit inflammatory action within the skull, and prevent the implication in the inflammatory process of any of the intracranial tissues. You must first shave the head, then apply the ice in a waterproof bag of some description—a bladder will answer well for this purpose—and see that the patient do not thrust the bag away from his head, which he is liable to do if he be at all conscious, since the application of the cold is highly disagreeable to him.

Further, the patient must not be allowed to starve; so you had better give him milk, the most harmless of all animal fluids, and give a definite quantity of it—a pint was allowed to this boy. After a while, let him have half a pint of beef-tea daily. Begin with this small quantity; let it be given under observation, and gradually increase it if no bad effects follow its administration. But often with this small quantity of good beef-tea, the patient's brain will become excited; he will be found talking nonsense, sleepless, and feverish; with hot skin, furred tongue, &c.; if such symptoms ensue, or if the patient be rendered uncomfortable, withdraw the beef-tea at once, and go back directly to the milk alone, and the feverish symptoms will then generally subside.

Here, then, we have a case of depressed bone; what shall I do with it? Shall I elevate it? The rule laid down by Sir Benjamin Brodie is very precise. In a case of depressed cranial bone, with no external wound and with no symptoms of compression, you are not to interfere operatively; but in a case of depressed bone, with compound fracture and depressed bone, even though there be no symptoms of compression, you are to elevate the bone. But with this dogma I do not quite agree; in cases of slight depression I would not operate unless symptoms showed themselves; especially so, in children under eleven years of age. You are liable to get green-stick

fracture of the bones of the skull. Almost any amount of depression of the bone at this age will be rectified by nature's internal hydraulic pressure, through the pumping of blood into the capillaries of the brain. The cerebral expansion, which occurs eighty or ninety times a minute, will gradually cause the depressed bone to be bulged out into its normal position. Under three or four years of age, never mind how great the local symptoms of depressed bone without symptoms of compression of brain, do not elevate the bone, even if there be an open wound, thus creating additional local injury, but trust to nature to elevate for you. The skull is then yielding, and gives almost as much in one part as it is depressed in another. Beyond this point, and under eleven or twelve years, I should feel very loth to trephine, unless the symptoms were very urgent. Take the other extremity of life. An old man may meet with an accident causing depression of the skull, and yet experience no symptoms, although he live some years after the accident. You must remember that the tissues of the brain waste in old age; so that depression of the skull is not then of so much consequence. The convolutions are always shrivelled in old men, and in truth the brain does not, in their case, occupy so much space as it did at the middle period of life. The space formerly occupied by the brain is now filled with cerebro-spinal fluid. I have here two casts of skulls. In this one (cast A), you will perceive there is a piece of depressed bone; but that it is undulating, and no doubt presents a comparatively smooth surface to the brain, and probably has no sharp points of bone by which the cerebrum could be irritated. The man from whom this cast was taken never had any symptoms traceable to the fracture of the skull, which had existed during several years. Now, compare A with the second cast (B). There is in B an angular depression externally. I will give you the history of the gentleman of whose head B is a cast. He was a surgeon, about forty years old, residing in New South Wales, and by his age you will conclude that his brain had not begun to be diminished in size, and that it therefore filled all the intracranial space. He received a kick from a horse, which caused an angular depression of bone, as represented by B, with no symptoms at first of compression. The bone was not elevated; and after his recovery from the immediate effects of the acci-

dent, whenever he went into active occupation, or became warmed by wine, or whenever, in fact, he allowed the circulation through the brain to grow excited by any cause, brain disturbance invariably ensued; he got headache, mental confusion, &c., so he gave up his practice, came to England, and consulted me. I kept him at rest in the country, forbade him the use of wine, and gave him bichloride of mercury. Under this treatment he was much relieved; he then went out hunting one day, and all the symptoms returned. Seeing that when he remained quiet, he was quite well, I thought it best not to subject him to the risks inseparably connected with the elevation of a depressed portion of bone. Acting under my advice he obtained, through some personal influence he possessed, a government appointment where there was plenty of income with a very little to do, and no mental excitement attendant thereon. He is alive, and enjoys a quiet life in tolerably good health, in South America. Now, there can be but little doubt, that if he had had this portion of bone raised at the time of the accident, even though no symptoms of compression were then manifest, he would at the present moment have been able to be actively employed. I think, therefore, that for the future, I shall trephine in a similar case; that is, in one with an angular depression of bone, although no symptoms be present; but certainly not in one where there is merely an undulating surface externally without angular depressions. I should in this latter instance wait for symptoms, which, after all, may never occur. We hope that in this boy's case the depression will be elevated by nature from within.

Lastly, what is to be done with the extravasated blood? It will most likely in time be absorbed. If such do not occur, it will be necessary after a while to open the scalp tumour. Such surgical interference having been given, the interior of the blood sac will then suppurate and heal up by granulations. Were I to open the tumour now, before the fracture is repaired, I should convert the simple into a compound fracture. Now, suppuration in a case of compound fracture of the cranium is liable to lead to the interior of the skull, because there is a communication existing between the dura mater and the exterior of the head. After the lapse of about

a fortnight from the accident, this communication through the fracture will in all probability be blocked up; so that I shall defer the opening of the tumour until that time, when I hope a layer of commencing callus will have occurred between the fractured portions of bone, effectually shutting off all communication between the interior and the exterior of the skull.

LECTURE III.

Strangulated oblique inguinal hernia (intestinal).

December 8th, 1864, mid-day.—J. S—, æt. 32, a healthy-looking labourer, was free from any hernial protrusion till six o'clock this morning, when, after a severe fit of coughing, he noticed a swelling in the right inguinal region, extending into the middle of the scrotum. He has since vomited twice; the vomited matter was not stercoraceous. A surgeon at Woolwich having attempted reduction without success, the patient came up to the out-patient's room of this hospital, and was sent at once to bed in Luke ward.

On admission, the hernial sac is very tense and tender. The patient is ordered to remain on his back in bed; ice is applied to the swelling; and two grains of opium administered by the mouth.

2 p.m.—Chloroform is given; but all attempts at reduction failing, Mr. Hilton operates. He finds the stricture or annular constriction at the external ring, which he divides, with about half an inch of the tendon of the external oblique muscle, and the bowel is returned by pressure made upon it. The sac is not opened. Three small arteries are tied.

10 p.m.—Patient feels very comfortable.

9th.—The patient has a slight bronchitis, otherwise is quite comfortable.

Ordered, Julep. Ammonia Acet. ℥j, ter die sumend.

10th.—No untoward symptom. Less cough. No pain in the wound, which to-day is discharging a slight quantity of pus. Abdominal walls flaccid.

11th, 10 a.m.—He feels comfortable, and has less cough. Bowels not yet opened since the operation.

1.30 p.m.—Bowels relieved; but the motion is thrown away without being shown to me. The ligatures and sutures are to-day removed, and the wound looks very healthy.

P.S.—April 8th, 1865.—The man subsequently recovered from the effects of the operation, and from the bronchitis, without an untoward symptom. It was found that the intestine descended whenever he assumed the erect position, so a truss was ordered for him, with which he left the hospital on January 29th, 1865, seven weeks after the operation.

GENTLEMEN,—Here is a man, aged 32, who has never previously had a hernia; and yet on the day of admission suddenly notices a rupture four or five inches long in his groin. I naturally ask—how does such a thing come to pass? The intestine (such afterwards proved to be the nature of the swelling), of course, descended either within the serous cavity formerly covering the vas deferens; or else, if that passage were obliterated, the bowel must have forced its way through the continuous areolar tissue as far as the scrotum. I think I can show that the former course was pursued. You will see from the report that the rupture occurred whilst the man was coughing; and although the pressure exerted on the intestines is at such a time great, yet I cannot regard it as sufficient to cause the connective tissue to be broken through so suddenly to an extent of four or five inches. Besides, such an extensive laceration of areolar tissue would cause a considerable extravasation of blood; whilst at the operation, to which the patient was afterwards subjected, there was found no extravasation—no blood discoloration—at all. Let me carry your attention back to foetal life, and remind you of the fact, that at that period the testicle descends from the abdominal cavity to the scrotum. In doing so, it becomes itself covered with a layer of peritoneum, and also pushes before it a second layer; these subsequently usually unite over the region of the inguinal canal, and by so doing, completely shut off the tunica vaginalis of the scrotum from the rest of the peritoneal sac. This occlusion of the serous cavity may occur

in various degrees. Sometimes no closure at all takes place; such a state of things occurs in the cases of congenital hernia where, at the time of birth, the intestine travels freely into the scrotum to the front of the testicle. In the case we are to-day discussing, I think that particular portion of the serous sheath which covers the vas deferens had never been closed up; that occlusion had only taken place just opposite the internal ring, or perhaps even a small opening was left there. The intestine burst through this slight impediment into the serous sac which existed in the region of the inguinal canal, and still formed a tube that the gut could, and did, easily traverse to the scrotum.

You will observe, that nothing is said in the report of pain in the groin; it is merely stated that the man noticed a swelling there. Now, I took particular pains yesterday to demand of the patient what had caused him to observe that all was not quite right with him. He answered that he had great pain in the part, and upon looking for its cause, he noticed the swelling; and so, I believe, you will always find it. When a large hernia appears suddenly for the first time, pain in the part (directing the man's attention to the spot) is invariably one of the earliest symptoms. Provided the patient has not before been the subject of rupture in the same region, it stands to reason that a hernia, four or five inches long, cannot suddenly occur without the production of pain. This point is judicially important; for it has fallen to my lot on three or four occasions to be consulted by persons who had some time, perhaps months, previously been in a railway collision, or had met with some other accident. A hernia had subsequently appeared, and they, imputing its production to the accident, were about to demand damages of the railway company. I always put to them this question—when did you first feel pain at the part? If the reply states some time after the accident, I assure them the company is not responsible for their malady; but if the pain were first perceived immediately after, and was continuous after the accident, then, perhaps, they have a better chance of *damages*.

“The vomited matter was not stercoraceous,” by this expression the dresser, I presume, meant that the vomit had not the smell of dung. It was quite right of him to notice this; but

stercoraceous vomiting is not often a very important symptom in hernia, as regards diagnosis. It ought to denote the presence of that which is ordinarily found only in the large intestine, or very low down in the small bowel; and which should, therefore, denote that the vomited matter has come from those parts. But if intestinal obstruction has existed for some time, the contents of the upper small intestine being a long time retained, will take on the odour of *faeces*, requiring a very delicate refinement of the olfactory sense to distinguish the difference.

Why does vomiting occur in these cases? Two explanations have been given; according to one, the vomiting is merely a phenomenon of nerve sympathy. Those branches of the sympathetic nerve which are distributed to the strangulated portion of bowel, suffer great functional derangement, which is soon reflected by their centres to adjoining nerves. This disturbance spreads until at last vomiting is produced, and everything is rejected by the abnormally sensitive stomach. Another explanation, and the one to which I incline, is that the vomiting is due to a retroverted peristaltic action of the intestines. If, as I have done, you open the peritoneal cavity of an animal—say a rabbit—and put a ligature upon the intestine, you will find the ordinary peristaltic action will go on all right as far as the obstruction, when it will become retroverted, travelling backwards towards the duodenum and stomach, and may so cause vomiting.

The treatment adopted on the patient's admission, was that which I think offers the best chance of reduction of the hernia. He was kept lying down upon his back in bed. By this means the venous blood of the vessels within the wall of the rupture, and within the strangulated portion of bowel, is relieved from all direct pressure of the superincumbent column of blood; this position also facilitates the gravitation of all fluids from the ruptured part. The ice promotes the same indication by diminishing the amount of arterial blood circulating in the walls of the intestine, and by so much decreasing the volume of the contents of the hernial sac. The importance of these points in the treatment cannot, I think, be exaggerated. But you must remember to keep the patient rigorously on his back; and he is not to be allowed to get up on any account whatever.

Moreover, keep the ice-bag always upon the hernial sac, and do not let the patient push it away, as he may feel inclined to do. Two grains of opium were given to arrest the vomiting, which indication the drug probably effects by calming and relaxing the action of the muscles of the intestinal wall, so that the contents of the bowel are not pressed on, and no retrograde passage of their contents supervenes. Opium also lessens the spasm and rigidity of the abdominal muscles, which press upon the intestines within the abdomen, and also constrict the neck of the sac. Hence opium assists immensely in the reduction of a hernia, and should always be given previously to the final trial at reduction. Chloroform destroys for a time muscular spasm, and is a very valuable auxiliary, with whose help it is often found possible to return a rupture that had previously resisted all attempts at reduction, made with the assistance of warm baths and opium only. In the present case, eight hours after the descent of the intestine, two grains of opium had been given, and chloroform was administered; but the hernia could not be reduced. Hence I think the evidence is pretty conclusive, that something besides simple muscular contraction thwarted our efforts at reduction.

How are you to reduce a strangulated hernia? Sir Astley Cooper stated very decidedly that you were to knead the intestine back again, one piece after another, through the hole by which it had originally escaped from the abdominal cavity; but this plan is not often successful, and it appears to me to be wrong in principle. You must first ascertain decidedly the nature of the hernia, whether femoral or inguinal. Do not rely in these cases upon statistics for diagnosis; they utterly fail here, giving you in the end nothing but a probability; whilst in your profession, and in this kind of case, a certainty is required. In determining what kind of rupture it is, you must depend on the physical signs of the individual case with which you are engaged. And to show you how important it is to determine precisely with what kind of rupture you are dealing, I will just mention a case that was some years ago treated by a hospital surgeon of this metropolis. He had failed to reduce what he considered a femoral hernia in a large fat woman, and had already made the first free incisions for the intended operation, when he saw something which suggested

to him the propriety of re-examining the site of the rupture. He did so, and found that the intestine came from above, instead of from below Poupart's ligament, as he had previously thought. He halted in his operation; tried again to reduce the hernia, by pushing the bowel in a direction different to that before attempted, and was rewarded by feeling it all go back. How then, I ask again, having ascertained the variety of rupture are you to reduce it? You must always relax as much as possible the muscles that surround, or act upon, the aperture through which the bowel escaped from the abdomen. I will exemplify this point by a reference to the method you should adopt, in attempting to reduce an intestinal protrusion of the same nature as that which forms the subject of this lecture. Having ascertained it to be an inguinal hernia, you relax the abdominal muscles and the muscles of the front of the thigh, by flexing and rotating slightly inwards the corresponding limb at the hip-joint. Next lay hold of the tumour firmly with the fingers and thumb of one, or of each hand, according to the size of the swelling; grasp it completely, and squeeze it very steadily and slowly, without any impulsive jerking with your hands. You may thus get rid of almost all the fluid and gaseous contents of the cylinder of gut, and of all the blood circulating in the hernial protrusion, and so reduce it very considerably. Then, and not till then, you begin to try and return it, which you do by pushing it towards the hole through which it has escaped. So you are not first to knead the mass towards the aperture, but you are to make it small enough to go through it, and when (after, perhaps, four or five minutes' steady compression) the hernia has lessened in size, push it towards the opening. Thus, you will very generally succeed in reducing a rupture. You cannot hope to force an orange through a keyhole, unless you first squeeze out the juice; a similar principle controls you in the case of the hernia.

But you may find it necessary at last, as I did here, to operate. Now, there are two rules which guide me in operating on such a case as this, and being strongly convinced of the soundness of the principles on which they are based, I urge them upon you for your adoption under similar circumstances. *First*, I omit opening the sac, if possible. For

when the sac has been opened peritonitis is, I think, more likely to follow the operation, than if the reverse course has been pursued ; wherefore, whenever practicable, I leave the sac entire. You must bear in mind that, when an incision is made into the hernial sac, the peritoneum—that delicate membrane—is in reality opened, and at the site of the incision is unavoidably exposed to the air, and to all the consequences in the track of contagion—sometimes fatal—which such an exposure may induce. But the operation for strangulated hernia, when the sac is not opened, is comparatively harmless. *Secondly*, I ligature all vessels pouring out blood, even before cutting them across, if they be visible ; the wound is thus kept free from blood, which often forms a great source of obscurity in the operation. One is also better enabled to recognise each tissue cut through, since every thing is patent to the eyes. Do not mind the delay that the practising of this precept occasions, but take away all obscurity from the line of incision—and assuredly blood in a wound occasions an immense amount of uncertainty. By scrupulously following this rule I was able, when I arrived at the tendon of the external oblique muscle, to see that it was tightly stretched across the hernia, forming a deep constriction, with bulging of the tumour both above and below. I divided the tendon for half an inch or so, made pressure upon the ruptured intestine for two or three minutes, and it all went up without my cutting any deeper. But it is not my intention to make any further observations on the operation itself.

Concerning the administration of purgatives, I wish to lay it down as an axiom, that—“in no case of hernia with symptoms of strangulation should you give purgatives, except for the purposes of diagnosis.” If, for instance, you are undecided as to whether the contents of the sac be omentum or a cylinder of intestine, then you may give a purgative ; if it act, the rupture is omental, and *vice versa*. A portion of strangulated bowel is of course in an inflamed condition, and a purgative renders it more so ; hence, you are to abstain from the use of any aperient medicine, except under the rare condition when you cannot make yourself quite decided as to the nature of the contents of the hernia, and are consequently compelled to use

the purgative in order simply to relieve your diagnosis of obscurity.

But, supposing an operation for strangulated hernia to have been performed, what is to be your subsequent treatment? You must assume that the piece of intestine is in a very deteriorated condition, enfeebled and inflamed. The inflammation in fact may have gone so far as to have softened the wall of the bowel. Inflamed tissues are always soft, so that they cannot resist pressure. As an example of this, you must often have observed the ease with which the demonstrator of morbid anatomy breaks down with his finger a piece of pneumonic—that is inflamed—lung. Now, since you do not know the exact condition of the portion of bowel contained in the hernial sac, but must assume that it is deteriorated, my advice is, that after the operation you leave it alone entirely. If the intestine be softened, and you give a purgative, the softened part will very likely give way, and the patient die from fæcal extravasation into the peritoneum. In the treatment of an inflamed part, such as the skin, conjunctiva, a joint, or any region which you can see, you avoid all possible disturbance of it; why then disturb an inflamed part, such as the bowel, which you cannot see? Hence it is better to give a grain or half a grain of opium two or three times a day, to keep the intestine quiet; and then, if it be not too much disorganized to recover, it will do so in the course of a few days. I wish you in this, and in all your cases, to recognise fully the principle upon which you are to base your treatment; this, and this only, can make you successful practitioners of medicine. All we can do is to help nature, and not to disturb her work of reparation, and to see that the attendant circumstances are such that recovery may be completed with the least possible effort upon her part. No one can put a new piece of intestine in the room of the injured portion; but it is possible by affording rest to the deteriorated bowel, to put it in the best way to become as good as new; and such should be your endeavour.

But some one will perhaps inquire—how long after the operation may a patient go on without having his bowels open? I have known a patient's bowels not opened for twenty-one or twenty-two days after the operation, for the intestine being

thought to be in a very bad state, no aperient medicine was administered. Yet that patient ultimately made a perfect recovery. You may, however, give a simple enema to clear out the lower part of the intestine, on the sixth or seventh day after the operation, if there be no other cause for anxiety except that no motion has been passed; for the patient, unless duly advised to the contrary, is apt to suppose that you have not relieved his state of "stoppage of the bowels."

I cannot dwell much on the fact of this man's bronchitis. It was probably due to the irritation of the chloroform, which sometimes produces a slight inflammation of the mucous lining of the bronchial tubes. Two days after the operation the patient was going on very well. His abdomen was flaccid. Now what interpretation are you to put upon this? Simply the following; you never see a flaccid abdomen in cases of acute peritonitis, unless in a certain low pyæmic suppurative form of inflammation of the serous membrane, coexisting with diseased kidneys; which occurs without any tension of the abdominal walls. All inflamed joints, in order that they may be kept at rest, are fixed by the continued contraction of the surrounding muscles; and when the peritoneum is inflamed, the muscles of the surrounding abdominal parietes are similarly contracted, so that they feel hard if pressed upon. Wherefore, for a few days after the operation, when you visit the patient, just lay your hand gently on the abdomen; if you find it flaccid, you may rest assured there is no peritonitis. My patient's bowels were opened on the third day. Now, it is your business always to see the first, second, and third motions that come away after an operation for strangulated hernia, to see if the constriction has been relieved, and in order that you may judge of the state of the bowel. If the stool contain matters from the small intestine, the obstruction has been removed; whereas, if from the large intestine only, the constriction may not have been relieved. Hard lumps of feculent matter usually indicate a motion from the rectum or colon only; but thin bilious motions have necessarily passed down from nearly the beginning of the small gut. See also if there be any evidence of the presence of mucus or blood in the motions; because if either be there, the intestine has evidently been much damaged. If blood be present the bowel has been

bruised, and the blood extravasated into its interior. Mucus indicates that the intestine is inflamed. Either case is suggestive of continued quiet to the gut; and it becomes your bounden duty to treat the intestine with gentleness and care. In such a case, support the patient's strength with fluid nourishment, and see that he does not take any indigestible solid food for two or three weeks. Solid food passes on, perhaps only half digested, from the stomach into the intestines; it presently comes against the inflamed and consequently softened spot, which is then subjected to pressure as well as muscular excitation of its own walls, and gives way. Extravasation into the peritoneum occurs; death results; and no doubt you get a most interesting and instructive, as well as a most condemnatory post-mortem examination. Fluid nutriment is absorbed, and forms scarcely any feculent matter; hence, for this kind of case, it is so much preferable to solid nourishment. At any rate, do not in any instance allow solid food before the bowels are relieved; because until then you cannot tell what is the state of the intestine. I was just now saying, that on the sixth or seventh day you may find it necessary to order an injection. You would suppose that if you told the nurse to administer an injection that would be enough; but I advise you to give explicit directions as to the quantity to be used, and as to the mode of its administration. I remember two instructive cases bearing upon this point. One was that of a lady upon whom I had operated for strangulated hernia. On the fifth or sixth day she was going on perfectly well, but was becoming rather fidgety because her bowels had not been relieved. I ordered consequently an enema of a pint and a half of gruel, which was repeated on two occasions by the nurse, who told us that the injection would not "stay up," and there was no evacuation of the bowels. I then suggested to the medical attendant that he had better personally superintend the administration of the enema. When he came to pass the pipe per rectum, the lady called out that he was making a mistake, for he had not placed it in the proper passage,—the nurse had always thrown the injection up the front passage.

The other case was that of a gentleman, for whom I ordered a similar injection. He had been married only a short

time to his second wife, a young woman; he had had some ulceration and suppuration within the prostate gland, accompanied with great pain and much discharge of blood from the urethra. The nurse was sent to my house in order to report the patient's condition to me. I directed her to administer an enema of a pint of gruel with some opium in it. The nurse told the wife my wishes, and the wife, conjecturing that the injection must be for the abatement of the prostatic symptoms, and that it ought to go in where the blood came out, told her husband that he must use it per urethram. Upon my calling next day to see the patient, I found him excessively angry, and his demeanour very different from what it had previously been; and then he burst out upon me, saying that he would rather die than submit again to the brutal and awfully painful treatment which I had prescribed. I calmed him sufficiently to learn that he had, after intense suffering, been enabled with a small syringe to transfer the whole of the pint injection through the urethra into his bladder. I had sent word that he was to use it all, and so, notwithstanding the pain it caused him, he had, after three hours' labour, forced the whole pint of injection into his bladder. Hence, again I say, give always explicit instructions as to how all your remedies are to be used.

LECTURE IV.

Irreducible inguinal omental hernia.

J. J—, æt. 49, a butcher, has had a reducible oblique inguinal hernia of left side for fourteen years, and of right side for six years. Neither have ever been strangulated. He has not been at work for eight months.

On Sunday evening (December 4, 1864) went to stool, and found left hernia down and irreducible; says, however, he passed a natural motion.

On Monday went to a surgeon, who tried to reduce the hernia, but failed. The surgeon ordered him to take a dose of castor-oil, and to foment the left groin with warm water.

The oil caused a free evacuation of the bowels; but the hernia being still unreduced, the patient was advised to come to Guy's.

On December 7th (Wednesday), at about 5 p. m., is admitted. The man is now cold and feeble. Swelling in scrotum feels firm and elastic; but is not tense nor painful. No pain in abdomen on trying to reduce the swelling. Has been no vomiting. Mr. Durham fails to reduce the hernia, so the patient is put into a warm bath; he is subsequently ordered to remain rigorously on his back in bed; two grains of opium are given by the mouth, and ice afterwards applied to the tumour.

10 p. m.—All attempts to reduce the hernia are fruitless.

8th.—Patient has had no vomiting since admission. No pain at site of rupture, unless reduction is attempted.

9th.—Patient's bowels have not acted. No symptoms of strangulation. Ice still applied to tumour.

10th.—Swelling now quite lax, but cannot be reduced.

15th.—Appetite good. Last evening, Pil. Cal. c. Col. gr. xv were given, and the man's bowels have this morning acted freely, notwithstanding the hernial tumour is still unreduced.

P.S.—April, 1865.—The man went out on January 2nd. Some of the hernia still remained in the inguinal canal, but a considerable portion had been reduced by Mr. Hilton. A large truss, hollowed out so as to fit the corresponding projection of the hernia, was applied to the site of rupture.

GENTLEMEN,—I shall commence by commenting upon the dresser's report of another case of oblique inguinal hernia. The man whose case I am about to discuss occupied the adjoining bed to the one upon whom I lectured last Friday; and I shall use this case in contradistinction to that. In the other patient the symptoms were urgent, but disappeared immediately after the operation to which we were compelled to have recourse.

The following points will strike you at once in the present report; the man, having had a reducible inguinal hernia on one side for fourteen, on the other for six years, finds one day that he cannot reduce the rupture. He goes to a surgeon,

who administers a dose of castor-oil, that produces a plentiful evacuation. You see, if the history be true, the case is very precise. There are not detailed any of the usual symptoms of strangulated intestine; whatever there was in the inguinal swelling, there most assuredly was not present any portion of strangulated gut. The castor-oil having caused the bowels to become freely opened, proves conclusively that the intestine was pervious from end to end; and, therefore, that none of it was strangulated. In a case of this sort, if you can depend on the word of your patient, lay hold of one or two circumstances which are proof against doubt, carry them in their full light before your mind's eye, reason correctly upon them, and then your diagnosis must be correct. But I will relate a case in point: it happened to me some years ago to have on the table of our operating theatre a boy with supposed strangulated intestinal hernia (the hernia was very tense and of considerable size), upon whom I was about to operate. For, on my arrival at the hospital I was told that I had in my ward a case of strangulated hernia which could not be reduced, and required immediate operation. He had had severe vomiting. Just before making my first incision through the skin, I casually asked the boy (it was before the days of chloroform) if his bowels had been opened. I then learnt that shortly before coming to the hospital he had taken a purgative, which had caused a plentiful evacuation of faecal matter. To my mind, this circumstance was so conclusive of the fact that the boy had no strangulated intestine within the sac that I was obliged to turn round to the students present and explain to them the real facts of the case. I again put to the boy the same question, and he answered exactly as before. I did not operate, but sent the boy back to bed; ordered leeches and fomentations to the hernia; the inflammation was reduced, and the omentum (for such, no doubt, was the nature of the contents of the sac) eventually went back into the abdomen. If, before going into the theatre, I had, as I ought to have done, asked the boy concerning his evacuations, and so made clear the history of the case, I should not have committed the blunder of putting him upon the table; but I had been told, when I came to the hospital, that the boy must be operated upon at

once, and so, without myself examining him, I had ordered him to be taken directly to the theatre.

In my last lecture I laid it down very decidedly, as a rule never to be transgressed, that, "In cases of supposed strangulated hernia you are never to give purgatives except for the purposes of diagnosis;" to determine, in fact, in doubtful cases, as to whether the contents of the hernial sac be intestine or omentum. This experiment was made in each of the two cases I am now relating (the subject of the present lecture and the boy on the operating table), and in both the doubt was cleared up by its being decided that the hernia was omental. Although the boy was suffering severely, his was most decidedly a case of inflamed omental hernia; there was no necessity for the knife; but opium, leeches, and warm fomentations formed the proper treatment.

An omental hernia feels loose; the omentum slips about beneath the fingers on pressure; and you can feel a series of longitudinal lines or ridges which are probably nothing but the distended blood-vessels of the omentum. But I cannot convey to you in words only a full and complete knowledge of the feel of the omentum; the sole manner in which you can perfectly learn to diagnose it is by exercising your fingers on every decided case you come across. You cannot, however, always tell by manipulation only, as to whether a hernia is composed of omentum alone, or whether there is (lying behind the omentum in the hernial sac) a small portion of cylinder of intestine which cannot be felt nor seen until the sac is opened. If there are symptoms of strangulation, and you are in doubt from the character of the tumour as to whether you are dealing with an intestinal or an omental hernia (because a knuckle of intestine which you cannot feel may, for aught you know, be lying behind the omentum in the hernial sac), you have just the case for the proper use of purgatives for the purpose of diagnosis. Give a good purge as a tentative; it will operate if no intestine is included in the sac. The case will at any rate be cleared up; and you know you must always do all you can to aid your diagnosis.

On the fourth day we find the man without any symptoms of strangulation, consequently no intestine was in the sac. Still, nevertheless, he had an irreducible hernia; and though it

was then only omentum, yet a portion of intestine is at any time liable to pass down and give rise to symptoms of strangulation.

In mercantile life, where the patient is always walking about, an irreducible hernia is a great nuisance, and may (as just stated) induce occasional strangulated bowel. I have had several cases come under my notice where the patients were willing to put themselves under surgical control for a month or so, provided they could be quite sure they would get rid of the rupture. Here, then, comes an important question—how are you to reduce an irreducible hernia? You must make the patient lie continuously on his back; lift up the scrotum; apply ice in a bag continually to the tumour; give him Hyd. c. Cret.; or some other mercurial each night, and a dose of white mixture (Mist. Magnes. c. Magnes. Sulphate) in the morning; let him take good meat diet and as little fluid as possible. Why all this? You must remember that the greater part of each of you is fluid, and that the wall and contents of the hernial sac are no exception to this general rule. Now, by making the patient lie continually on his back; by sustaining him uninterruptedly in the horizontal position; and by elevating his scrotum, you facilitate the flow of venous blood from the hernia, and consequently take off a deal of congestion to which the ruptured parts were subjected so long as the patient stood or sat up. But you must impress upon him the fact that, however disagreeable to himself, he must nevertheless keep *always* on his back. Should his bowels be relieved he must not get up to the stool, but must have a bed pan placed beneath him. Why is the ice used? Cold lessens the afflux of arterial blood to a part. When applied to the tumour it diminishes the flow of blood through the vessels of the wall of the sac, and influences similarly the quantity of blood circulating in the capillaries of the omentum or intestine. It may in fact do this too much, and cause gangrene. A few years since I saw a case of large umbilical hernia, with a thin layer of integuments over it, and in an old person, to which ice was applied for a few hours only, yet upon operating I found the intestines pale, flaccid, cold, stinking, and gangrenous, owing to the deprivation of its blood by the too intense cold which had been employed. If the person be old and weak, and you judge him not capable of

withstanding much continued deprivation of temperature, you should take away the ice and apply an evaporating spirit lotion which is not so cold. Why use the mercury and chalk? The contents of the sac are often glued together and to the surrounding walls by recent or old adhesions. Now, mercury deteriorates the lowly vitalised fibrinous matter of which these adhesions are composed, and then the healthy serous membrane absorbs it. If irritated, serous membranes are secreting sacs; but they become absorbing surfaces as soon as the secreted materials forming the adhesions are deteriorated. *Rest* reduces notably the thickening produced by old inflammation of joints; similarly you must hope to aid absorption of the hernial adhesions, by removing all disturbance of the parts, which is best done by keeping the patient quiet in bed. Why give M. M. c. M. S. each morning? I believe you can unload the portal system to a great extent by Epsom salts; in other words this drug diminishes the blood circulating through the portal system. Give also as little fluid nourishment as possible, for fluid occupies a considerable space. Meat is the best food on this account, and all apprehension of constipation is avoided by the daily dose of white mixture. You cannot fail to see that the diet I last week recommended in the case of strangulated intestinal hernia, and that which is in favour with me to day for irreducible omental hernia, are exactly the reverse of each other. In each instance I recognise the principle upon which I am to treat the patient; and the principles being widely different, I am compelled to use medicines and food also of different kinds.

By following the several directions I have just given, a hernia previously irreducible may often be reduced in a fortnight or three weeks. You will perceive that most of the points in the treatment have for their object the diminution of the quantity of fluid in the sac and its contents. Inflexibly, I say, you must make the patient lie continually on his back in bed, with his scrotum well up. He must not be allowed to get up on any account whatever. You will perhaps lay great stress upon this point when you come to learn that the veins of the omentum have no valves; that they have no attendant arteries, from the pulsations of which the venous blood-current can receive impulses to its onward course; and

that they further have no muscular force, like that in the midst of which lie the veins of the extremities, to aid in the accomplishment of the circulation. You must consequently, by the means I have related, be sure not to allow the omental veins to become full of blood in a case of irreducible hernia.

Compound separation of carpal epiphyses of both radii from the shafts of the bones; tetanus on sixth day; death.— R— B—, æt. 14, a bricklayer's labourer, admitted into Cornelius ward, under the care of Mr. Hilton, on December 13th, 1864. As he was drawing up some bricks, half an hour prior to admission, the scaffolding gave way, and he fell a distance of about forty feet. The fall was somewhat broken by his striking against rafters in his descent. He fell on a heap of bricks, with both arms and hands thrust forward in order to diminish the effect of the fall. His abdomen came violently into contact with the ground; but his head did not strike anywhere, except against a board as he was falling.

December 13th, 10.30 a.m., half an hour after the accident.— He is collapsed, and complains of great *pain in his chest and right hypochondrium*. I cannot find any broken ribs. Whilst his wrists are being examined he revives a little, and then complains of thirst and cold. There is a contused lacerated *wound extending along the centre of his forehead* from the root of his hair to his nose. The *right radius is fractured* about one inch above the articular surface; the ulna of this side seems to be entire. In consequence of the fracture, the head and distal end of the radius are dislocated backwards; but extension readily reduces this misplacement, with a feeling of crepitus over the region of fracture. There are two transverse slits on the anterior surface of the wrist, laying bare the flexor tendons, but not exposing the bone. The hæmorrhage from these wounds is trifling. The *left radius is fractured* similarly to the right, with a corresponding dislocation; only in this case the end of the radius is exposed, and there is more hæmorrhage. On feeling the exposed end of the bone it is noticed to be comparatively smooth. Mr. Ray (house-surgeon) suggests that this may be due to a separation of the epiphysis from the shaft. The dislocated extremity of the bone is fixed with considerable firmness in its abnormal position, and

there is much difficulty in getting the fragments into good position. The radial artery, but not the ulnar, can be distinctly felt. He passes water freely. There is no paralysis whatever.

Treatment.—Immediately upon his admission, a little milk is given him, hot bottles applied to his feet. A little brandy is administered during the setting of the fractures. The edges of the wound on the forehead are brought together with simple strapping. A pistol-shaped splint is put on the outer side of each forearm and hand; and bandages are applied, leaving exposed to view the wounds, which are dressed with dry lint.

From December 14th to December 19th, the patient progresses without an untoward symptom; once or twice I give Tinct. Opii. \mathfrak{mxx} at night, because he is restless. At about 10.30 p. m., on December 19th, he complains of a little soreness about the throat, and of stiff neck.

20th, 8 a. m.—Being called to see him, I find his corrugatores superciliorum contracted, lower jaw fixed, neck rigid, and abdomen hard. Opium is immediately given him; after which he remains pretty quiet till about 3 p. m. Then he has a severe opisthotonic spasm; and his chest becoming rigid, he looks as though about to die. The spasms become more severe, and recur frequently till 5.35 p. m., when he dies.

Autopsy.—Only the wrists allowed to be examined. As soon as the splints are removed, the dislocations recur. At the *right* wrist, epiphysis of radius found separated from shaft of bone. Wrist-joint unscathed. No suppuration about the fracture. In the *left* arm a similar dislocation is found, and also an oblique fracture of ulna about an inch and a half above wrist-joint. Suppuration exists about the fractured bones, which are bloodless and saturated with fetid pus. Periosteum of shaft of radius found stripped off to a considerable extent.

GENTLEMEN,—The accident happened to a boy aged fourteen; and I direct your attention especially to the age, because on this circumstance was dependent the nature of the injury sustained by the bone. Here was, then, a boy who had fallen forty feet, half an hour prior to admission, and had alighted on a heap of bricks with his face downwards, and both hands stretched out after a kind of spread-eagle fashion. When

brought into the ward he was collapsed, which circumstance imparted additional seriousness to the three pathological conditions from which he was suffering. These three conditions, with their consequences, had to be considered and treated. The wound upon his forehead indicated that he had struck his head in his descent, so that the collapse might have been regarded as a sign that the patient was suffering from concussion of the brain. Secondly, the blow upon his abdomen might have ruptured some of his abdominal viscera, which would directly have originated the collapse. Thirdly, he had besides two broken wrists; so that the case required some time for the full development of all its details. No broken ribs were discovered. Often after an injury it is difficult to detect whether there be a broken rib or not. If the rib has been broken posteriorly beneath the thick layer of muscles there situate, by a blow on the part, there is frequently much contusion and you may not be able to get any decided evidence of broken rib by examination at the injured spot. Place the patient upon his back, and then press on each rib anteriorly at the side of the sternum, commencing at the first rib and going downwards. The ribs being fixed behind, by this plan of procedure you move the broken ends on one another and produce pain; you thus can tell with accuracy which rib or ribs are broken. If the continuity of the arch be complete, pressure at one end will not cause any increase of pain in the course of the rib. You may hear crepitus in the broken bone, by the ear simply, or through the stethoscope placed over the site of fracture, whilst the patient takes a deep inspiration.

The boy's collapse might have been due to injury of the liver, for he complained of great pain in the right hypochondrium; it was, therefore, quite right of the dresser to allow the patient no brandy. When there is even only the possibility of such a lesion having occurred, reaction should not be hurried on; but it is the duty of the house-surgeon and of the dresser to keep the patient collapsed for some hours, if not for two or three days, after the accident, in order to give the blood-vessels of the injured part time to heal. You must remember that the patient is on the brink of the grave; it is your business to keep him hovering over it, without allowing him actually to fall into it. If you give him stimulus, you will

force the heart to increased action ; send the blood with greater rapidity through the system : and, should a plug have formed in any injured vessel, it is forced out by the greater force of the blood-current, hæmorrhage again ensues, followed by death. In my regular lectures on surgery, I used to mention a case in illustration of this point. A man who had received a severe blow in the right hypochondrium, besides being much injured in other parts, was brought to the hospital. On admission, he was severely collapsed. Judging from this and the other attendant circumstances of the case, I came to the conclusion that he had ruptured some internal viscus, probably the liver. He was consequently starved for several days, and went on well until pyæmia supervened on an injury to his head, of which he unfortunately died. Upon examining the body, I found an extensive rupture of the liver. All the blood that had been extravasated into the peritoneum had been absorbed, and the lacerated wound of the liver healed. Several blood-vessels of the liver had been torn across, and, no doubt, had this man been treated with stimulants, the increased force of the blood-current thereby produced would have forced out the clots from the mouths of these vessels, and he would have died directly from the hæmorrhage thence ensuing.

Hot bottles were applied to the boy's feet. Do not place the bottles next to the skin of a collapsed patient, who, perchance, may be unconscious. You may raise blisters on the sole, and even destroy the integument. But put the hot bottles in flannel first, and then adjust them to the feet. I have seen tetanus produced by the scalding effect of extreme heat applied by means of hot bottles directly to the skin.

No prolonged symptoms of injury of the brain, or of any of the abdominal viscera, occurred in this case ; so that all the interest after the first day or two, was centred in the injury sustained at the wrists. The continuity of the right radius was destroyed at the junction of the epiphysis at the base of the bone with the shaft. There were two transverse slits in the skin, over the anterior surface of the same wrist. Only one could have been caused by the protrusion of the "broken radius ; the other was probably produced by great flexion of the hand backwards, causing great tension of the skin in front, which then gave way. The left radius was fractured similarly

to the right ; but in this case the end of the shaft of the bone projected through a wound anteriorly. The projecting portion being smooth, the house-surgeon conjectured wisely that a separation of the lower epiphysis from the shaft had occurred. The projecting bone had passed between the closely grouped and tense tendons, indicating that great force had been expended in producing this separation of the epiphysis. Is this separation at the epiphysis a true fracture ? It is a jurisprudential question ; and I will relate a case in which this very point was raised. Many years ago there resided in the country, on some land he possessed, a man, in fact, a gentleman, as far as means and position were concerned, if not by his conduct, who unfortunately could not control his temper. One day, he caught a boy up one of his cherry-trees, stealing the fruit. The boy would not descend when told to do so ; this exasperated the farmer, who having a gun with him, levelled it at the boy and fired. The boy fell to the ground, wounded, and after a time, died of the injuries he had sustained. The man ran away ; but two years subsequently, having, I suppose, remunerated the friends of the boy, he returned to his farm. Afterwards seeing, as he thought, another of his boys idle, he kicked him, causing a separation of the epiphysis of the great trochanter from the shaft of the femur. Suppuration ensued at the injured part, and the boy died. The farmer had to bolt again, but was caught, and indicted for murder ; having produced the boy's death, according to the report of the medical man who made the post-mortem examination, by "*fracturing the thigh bone.*" The counsel for the defence took advantage of this verbal inaccuracy in the indictment, and used it successfully in his client's favour, proving satisfactorily that it was not a fracture, but a simple separation of portions of bone from disease ; and so the prisoner got off. The thigh-bone, trochanter, and adjacent parts were sent up to me, in order to verify the separation of the epiphysis ; and as no doubt could be entertained about the character of the accident, the indictment for murder failed from the inaccuracy of the designation of the injury to the bone.

I must now hurry on through the remainder of this case. The median nerve could scarcely have escaped injury at the time of the accident, lying as it does in the midst of the

tendons through which the fractured bone protruded. The boy eventually died of tetanus, which I think was caused by injury to the median nerve. I shall not talk to you at all about the tetanus; but I wish to say a few words with regard to the treatment of the fracture. Pistol-shaped splints were applied to both radii—why so? Because undoubtedly the dresser thought he had two instances of Colles' fracture to deal with. He had learned to treat a Colles' fracture with a pistol-shaped splint, and so that form of apparatus was used in this case. Now what is a Colles' fracture? What's in a name? You must never depend for your diagnosis on the personal name given to any lesion, but first ascertain the facts of the case, and then reason out for yourselves all its conditions and requirements. Sometimes, whilst going round the wards, I am told, here is a case of Potts' fracture. I occasionally ask the dresser, to what pot he is alluding? and whether the chamber-pot is broken? for a beginner in the wards is very apt to be satisfied with the name alone of an injury. That which is ordinarily designated a Colles' fracture, is an oblique fracture through the base of the radius. Now, the pronator quadratus muscle passes transversely from the lower portion of the ulna to the lower portion of the radius, the ulna being its fixed point. All muscles act towards their more fixed point, consequently in the fracture I am now describing, the pronator quadratus separates the ends of the fractured radius by drawing the broken lower fragment towards the ulna, and somewhat forwards. Mr. Colles, an excellent anatomist and surgeon of Dublin, found that by putting the hand in the position it is made to assume by the pistol-shaped splint, he could thrust away from the ulna the upper end of the lower piece of radius, and thus get the two fractured portions into good position. It is your duty to oppose and prevent this separation or displacement of the broken ends; and you can generally do it by means of the pistol-shaped splint. You do not, however, use that particular apparatus, following blindly Mr. Colles, or any one else, who may tell you that such is necessary; but you use it, knowing that you have to oppose the action of the pronator quadratus muscle, which alone determines the necessity for the splint in question.

In the case of this poor boy, the pistol-shaped splints were

wrong and unnecessary ; seeing that the epiphysis was separated from the shaft of the bone, that consequently the fracture was transverse and not oblique, and that the pronator quadratus was necessarily attached to both portions of the fractured radius, and acted equally upon each. Now, here a pistol-shaped splint, by keeping the lower end—that is, the epiphysis of the radius—away from the ulna, would actually separate it from the shaft of its bone. Consequently, a straight longitudinal splint would have been preferable.

The dresser was quite right to leave the case for a few days, carefully watching for any symptoms of injury of the abdomen, before he gave the purge ; for the intestine might have been bruised when the boy fell.

At the post-mortem examination, it was discovered that a forcible separation of the epiphyses of both radii had taken place. Such an instance as the result of accident is rarely seen, and could not have occurred if the boy had been a few years older, for at about the twentieth year the epiphysis is consolidated with the shaft of the bone. Here are both epiphyses, with the adjoining portions of the shafts of the radii, in this plate ; you will perceive that the specimens from the left wrist are bloodless, saturated with pus, and dead ; this resulted from the periosteum having been stripped off the bone at the time of the accident, the bone being thus deprived of its proper medium of nutrition, there resulted the death of bone and the purulent condition associated with it.

LECTURE V.

Senile (?) gangrene ; death : autopsy.

G— F—, æt. 45, admitted into Luke Ward on August 1st, 1864. During last winter he suffered very much from cold hands and feet, and also had two or three attacks of gout. About March he felt pain in the extremities of the toes of the right foot, as if from exposure to cold. He was treated for

gout. The pain increased, being easier during the day, but quite preventing sleep at night. Red patches formed in the skin on the anterior part of the foot, they afterwards became of a dusky blue colour. Poultices were applied; the blue patches then disappeared, and he walked about a little. One night, about two weeks ago, he was suddenly seized with severe pain in the toes of the right foot, especially in the middle one, which in the morning was of a bluish-black colour.

On admission, he is very pallid. The hands and feet very cold. The three inner toes of the right foot are of a bluish colour, the third toe particularly; and there is deficient sensation in them. There is pain in all the toes of the right foot, especially in the third toe. There is no pain in the left foot, but the toes there are a little bluish and cold; and sensation in that foot is not quite so good as it ought to be.

August 1st.—Both limbs to be covered with cotton-wool and oiled lint, up to the knee. Full diet. Wine 8 oz.

℞ Sp. Ammon. Arom., ℥xxx;
Liq. Cinch., ℥xx;
Ex. Inf. Lupuli, ℥j, ter die sumend.

℞ Tinct. Opii, ʒss;
Aquæ, ℥j, fiat haustus omni nocte sumendus.

September 23rd.—Ordered felt plaster and a water-bed. These are to protect a small bed-sore which has formed on the sacrum.

October 3rd.—In the left foot no change has occurred since the last report; but the leg of this side is œdematous. The right leg also very œdematous, pitting upon pressure. All the toes of the right foot black, dry, and shrivelled. No discharge from the toes, and no indication at any spot of a process of separation between the dead and living parts. The anterior tibial artery can be detected by the touch feebly pulsating at the front of the ankle-joint; the vessel itself seems healthy. Posterior tibial not discoverable. Sounds of heart very feeble; no bruit. Patient's appetite pretty good. Pain in right foot severe; to lull this, he takes nightly half a grain of morphia.

17th.—A line of demarcation (in the shape of a deep cleft) at bases of toes of right foot is now formed, from which

a fetid sanious discharge is established. The small bed-sore is healed over.

24th.—Line of separation still growing deeper. The discharge of purulent matter from the ulcerated boundary line, increasing in quantity, appears to have irritated the skin covering the dorsum of the foot, so that it is also gradually ulcerating away. Wherever such is the case pus is formed, and flabby pale granulations arise.

November 7th.—All the toes of the right foot, being dead, have this week been removed at the metatarso-phalangeal joints.

10th.—The weather has suddenly become much colder during the past few days, and the temperature still remains much depressed. On removing the dressings this morning, I find the previously ulcerated portion on the dorsum of the foot now quite black.

17th.—The blackening was quite superficial; flakes of sloughing tissue now come away, leaving pale granulations as before. Very much pus is discharged.

29th.—The left foot has suffered no change since he entered the hospital. The tissues covering the heads of the metatarsal bones of the right foot seem gradually to be melting away. Wherever in the progress of ulceration a ligament or tendon is exposed, it seems to slough away at once. In other words, the tendons and ligaments are apparently much less able to resist the morbid process (when once they are exposed to the air) than are the muscles. With regard to the areolar tissue, it sloughs away from beneath the skin, and thus the integument surrounding the ulcerated patches comes to be considerably undermined. The purulent discharges also run up in the sheaths of the tendons, and soon a sloughing surface occurs some distance up the limb, through which the fetid materials make their appearance. The skin of the heel is sloughing away, although the limb has for some months lain on a water-pillow. The dressings are now changed every other day, in the following manner. The wound is first washed with a solution of permanganate of potash in lukewarm water, and dried. Then layers of lint soaked in lukewarm olive-oil are placed over the limb, as high as the knee. Next, a thick layer of cotton-wool is adjusted; and finally flannel bandages, lightly

applied, retain the other dressings in position. This plan is adopted in the case of both legs. By warming the water, and then the oil, and by using as much expedition as is possible, his sufferings are reduced to a minimum. The patient is troubled much with diarrhœa, and his bowels are greatly distended with flatus, which adds to his sufferings and prevents him from eating so heartily as he otherwise would do. At night, after a second dose of morphia, he is usually able to get some sleep.

January 8th, 1865.—During the last month the patient has gradually become weaker, and the sloughing surface has extended up beyond the ankle-joint. There has at no time been any hæmorrhage. He has been moribund for more than a week past ; this morning he dies.

Report of the appearances found at the examination of the body twenty-eight hours after death.—Head not examined. Lungs healthy. Heart.—The coronary arteries throughout were found diseased ; one part was especially atheromatous, and has been preserved. Upon placing a portion of the muscular tissue of the organ beneath the microscope, the transverse striæ of the muscular fibrillæ were found to be gone in most situations, a fatty granular deposit occupying their place. Coats of ascending aorta thin, but not incrustated with atheromatous deposit. Spleen much enlarged and softened. Liver enlarged and fatty. Intestines distended with flatus. Left leg and foot have apparently suffered no change, beyond the fact of their being wasted like all the rest of the body. Right leg and foot, toes all removed at metatarso-phalangeal joints. The blackened heads of the metatarsal bones are projecting beyond the line of the soft tissues. All the skin of the dorsum of the foot has gone, leaving a ragged surface of sloughing tendons, muscles, &c. This appearance extends up the front of the leg for about four inches beyond the ankle-joint. Skin of sole of foot still perfect. At the heel is a sloughing patch of exposed bone and tendon, which is about an inch and a half in diameter. Anterior tibial artery in the middle third of leg cut down upon and found patulous ; its coats thin.

GENTLEMEN,—The case I bring under your notice to-day

is one styled by the dresser a case of senile gangrene. In other words, it is a case of gangrene or mortification, or death of certain tissues ; and is of the variety conventionally termed senile, occurring, as it most usually does, in advanced life. It is called also dry gangrene, being accomplished without inflammation ; and is due to a defective, or completely arrested, supply of arterial blood to the diseased part. The part, in fact, dies because it is not supplied with blood. In true senile gangrene, occurring in extreme old age, the arteries are in a diseased condition ; they have lost their elasticity, are not contractile nor dilatable. Their calibre is diminished by an atheromatous deposit on the interior of their walls, and ultimately the passage through the arterial vessel becomes quite obstructed. Thus, then, dry gangrene is caused by a gradual diminution of the supply of blood ; and, in consequence of this, the affected limb usually altogether wastes. This pathological condition of atheromatous deposit has not been recognised, so far as I know, in the capillaries of the part. Senile gangrene in the upper extremity is rare. I have not seen more than one or two cases. In the upper extremity the arteries are not only numerous, but they also anastomose very freely, so that there is an extensive compensatory distribution of arterial blood if one of the small arteries becomes obliterated. You may sometimes see gangrene produced in the upper limb by pressure on the nerves. Such a case is described in some lectures I gave a few years ago at the College of Surgeons (page 190). Is the mortification in such an instance due to the direct influence of the nerves on the nutrition of the limb ? or, is it due to a diminished calibre of the capillaries ? I cannot give you a decided answer to this inquiry. It may be that the interference with the nervous influence leads to deterioration of the structures supplied by the nerve, ending in gangrene ; but mortification will equally result if the capillaries be diminished in calibre through the nerve twigs around them being deprived of their function by the pressure on the nerve trunk. For the branches of the cerebro-spinal nerves have certainly the power of altering the calibre of capillary vessels. (See also Lecture I.) Instances of senile gangrene on the whole, however, are not uncommon. I have been called, in my private practice, during the past week, to two incipient cases ; and I have now in

Charity ward a third patient, whose feet have a decided tendency that way, for they are cold, bluish, &c. To recapitulate, then ; senile or dry gangrene is due to a loss of elasticity, of dilatability, and contractility, and to a diminished calibre, of an arterial vessel. This, as you know, is a common pathological state of the arteries of old people ; it causes a diminished supply of arterial blood to a part—to the foot, taking the present case for example ; and the part shortly dies because it is not duly supplied with blood. I have said that the case was one of senile gangrene ; yet the man's age was only forty-five, so that his disease was not due to senility. Yet, though not aged in years, he was old in structure ; and, as in ordinary senile gangrene, the mortification was due to a diminished supply of blood. It was not, in fact, a typical case of senile gangrene, not being dependent on a pathological condition of the arteries. But I imagine it makes very little material difference to the circulation in the foot, whether the blood be propelled to it by an enfeebled heart with healthy arteries, or by a comparatively strong heart with very diseased arterial vessels. In each case the circulation through the extremity must be feeble.

I may remark in passing, that if any of you are called, during the winter months, to see an aged patient with cold hands and feet, your proper line of treatment will be to dress those parts with some bad conductor of heat, and to see that this is specially done during the night.

The red patches on the front of the foot may probably be thus explained. They were due to capillary congestion, the change of colour being caused by a difference in the contained blood. The red patches at one time were perhaps due to arterial, the blue on another occasion to venous congestion.

Should poultices be put on in such a case ? In other words, should warmth and moisture be applied ? We must first inquire into the action of these therapeutical agents. Warmth and moisture contribute to fermentation and putrefaction, so that they diminish vitality in a part and tend to cause ordinary chemical affinities to resume their sway, uncontrolled by the vital forces. For putrefaction is nothing more nor less than the spontaneous decomposition of tissues through the operation of natural chemical affinities — as distinguished from the

affinities which obtain during life, that is in vital chemistry. After the death of any structure, ordinary chemical affinities manifest themselves in it, undiminished in their strength by vital powers. Hence, if you wish to prevent putrefaction, do not apply warmth and moisture by means of poultices.

A fortnight previous to the patient's admission into the hospital, his disease appears to have manifested itself. The bluish-black colour of the middle toe was due to extreme congestion, or perhaps to some extravasation of blood through the rupture of the walls of the distended capillaries. Why was the sensibility diminished? Simply because perfect sensation is in part due to a proper circulation of blood through the capillaries, and the capillary circulation was defective in the present instance. Of the truth of this reasoning you cannot have a better example than is afforded to any of you who may happen to go out shooting on a very cold day. The fingers, unless well protected, become by the cold much contracted in size; the blood is forced out of them, consequently sensation becomes deficient. On arrival at the house, with the return of heat and of blood to the hand sensation is restored.

Why was the local treatment with oil, &c., adopted? I will explain one by one the therapeutical measures to which we had recourse, partly so as to guide you in any similar case that may in future come under your care, but chiefly to excite you to think for yourselves. I have before frequently told you of my idea of the object of teaching in surgery, and I will now repeat my words. The end which we have in view is not so much to cram men's heads with a certain line of treatment for every separate emergency (if such could be done), but rather to set them thinking, so that as rational beings they should reason for themselves. Why then did I order to be put on the oil and cotton-wool? On what principle was this plan adopted? Oil and cotton-wool are, as you well know, non-conductors of heat; so that when applied they cause to be retained in the part all the heat which is there generated. Now, the circulation through the capillaries gives rise to heat, and this heat is the reacting physiological stimulus on the capillaries which excites them to normal nutrition, to growth and reparation. Hence this same heat helps the capillaries to defend the other tissues of the part and themselves from the

bad effects which ensue from defective nutrition and want of reparation. It is by means of the capillaries, and of the capillary vessels only, that ordinary nutrition and growth are carried on, that a wounded surface heals up, and that other nutritive processes take place. Therefore, where the capillary circulation is feeble, the heat thereby generated will be feeble; the reacting physiological stimulus on the capillaries will be weak, and the performance of nutrition cannot be otherwise than imperfect. Consequently, at the same time with gangrene of the toes, the whole limb becomes smaller—a result of defective nutrition. Hence, in such a case as the present, it behoves you to retain within the part all the heat to which the capillaries give rise; and this indication is in practice best fulfilled by clothing the part in oil and cotton-wool. The beneficial effects of this treatment are manifested in such a case as the following. You are called, we will suppose, to a person in a scrofulous, enfeebled state of health, suffering from ulceration, the sequel of an abscess in the neck. The overlapping skin is of a dark leaden hue, with its temperature low, or less than that of the surrounding parts, and the ulcer produces a thin *puruloid* matter from underneath the skin overhanging its edges, all of which characters denote as plainly as possible the low vitality of the part. I will suppose that it has been treated for some long time with warm poultices, and no amendment is visible. Cover the ulcer and its circumference with a layer of oiled lint and cotton-wool, and within forty-eight hours that scrofulous ulcer will have lost all its leaden hue; the discharge will further have become *purulent*, marking the healthy change which has been effected in the capillary circulation of the part. I am not now describing an ideal case; it is a reality, for exactly analogous instances have occurred to myself, over and over again. You often get overlapping skin around, and pale flabby granulation forming the surface of, an ulcer, the result of carbuncle. With warmth and moisture, no benefit will be produced; apply oil and cotton-wool, and watch the healthy appearance the ulcerated surface will usually assume, often within the space of twenty-four hours only. The very same remarks will apply to bed-sores. These occur only when by pressure the nutrition of a part is impaired; therefore, you must retain all the heat spontaneously

generated within the part ; and I believe that this indication is best fulfilled by the application of oiled lint and cotton-wool. Well ; all this is very simple, and follows naturally from our recognition of a physiological principle. It is no mystery ; and let me tell you there is no mystery in our profession except that caused by our own ignorance. The principle I wish you to recognise fully in all its significance, is this—that the heat which the capillaries themselves generate is a source of growth, a stimulus to nutrition ; and therefore, to you, as surgeons, is of the greatest value, since it is one of the most potent influences you can bring to bear in the treatment of disease. You must recollect that you cannot of yourselves repair a breach of surface, or heal up an ulcer ; you must act as handmaidens to nature, taking care that nothing shall interfere to prevent her from using her reparative powers to her best advantage. I will give you one or two more instances in which you may best assist nature by retaining the heat of parts ; then I must pass on. You will frequently find the limbs cold from defective nervous supply, after brain or spinal-marrow mischief. A middle-aged gentleman, at present under my care, had, when I first saw him, great difficulty in walking. He could scarcely hobble into my study, and his feet and legs were very cold. I had them rubbed night and morning with oil ; the good effect was very marked. He came to me a fortnight subsequently, and on this occasion walked almost briskly into my room. Again, you often observe in children, as the result of chronic disease in the brain, that one limb is atrophied, and does not grow as fast as the other. Nothing is here of so much use as the local application of oil to the atrophied member ; nothing else will so conduce to its growth ; and I would suggest to you the recollection of these remarks, and your acting upon them in the cases of growing children, whose limbs, especially the legs and feet, are habitually cold, and the whole limb grows very slowly, or remains thin and imperfectly developed in its details, the ankles and feet giving especial evidence of defective nutrition. In such a case, use the oil as a non-conductor of heat, in order that the limb may have all the advantage of the engendered stimulus of heat and its reactive influence, to excite the natural processes of growth and repair. I know from experience that such is the good result

of the local application of oil in such cases, and the adduced hypothetical explanation may be the true one; at any rate, I believe that it is so. Another question arises in relation to our case of gangrene—is it right to use artificial heat? If it be of a high temperature, you will certainly contribute to the death of the part, the very result you wish to avoid. If the artificial heat be maintained at a uniform and moderate degree by means of hot bottles through flannel, it may now and then, perhaps, be of service. But I should be very cautious in its use; and the hot bottles should never be applied next to the skin, because its vitality being already much diminished, a very little extra heat will cause its death at once. In these cases of gangrene of the foot, nutrition is generally capable of being maintained as far down the limb as the knee; that is, the gangrene seldom creeps up beyond that joint. The explanation of this lies in the fact, that there are numerous good-sized anastomosing arterial vessels at that part, circulating the blood by numerous channels freely around the joint; consequently, it is not usually necessary to cover the limb with the oil and cotton-wool higher than the knee-joint.

Why the constitutional treatment? Why give opium? The pain was great, causing sleepless nights. Now, a sleepless condition is a very exhaustive one to a patient; therefore, just as much opium was given as it was thought would cause freedom from pain, and so enable the patient to sleep. Opium, in large doses, depresses the circulation, and so accelerates the death of the gangrenous part. You must choose between the two evils that arise from not giving opium at all, and from giving overdoses, and must steer a middle course. Moreover, you must keep up the action of the heart, which is best done by wine, ammonia, and bark. Infusion of hop formed in the present instance a good vehicle for the exhibition of the stimulants as it is a slight anodyne. The patient's appetite must be tempted by nourishing diet, in order that his blood, which is usually in an impoverished condition, may be capable of contributing to healthy nutrition.

In treating senile gangrene there is yet another element to which we must attend; I allude to the position of the limb. The circulation in the lower extremities is carried on by arteries lying between *venæ comites*. The veins occupy this

position, so that all the aid possible may be derived by the general circulation from the pulsatile movements of the arteries. Each pulsation in the artery preesses on the accompanying veins, and forces the venous blood along in one way or another. Its right direction is given to it by the valves in the veins; and thus the arterial pulsation in the lower limbs comes to afford material assistance to the venous circulation. If the artery from any reason beat feebly, the walls of the *venæ comites* receive equally weak pulsatory beats, and the contained blood loses a material help to its onward progress. It consequently stagnates, and its watery parts exude, so that often in these cases both legs are dropsical (*passive œdema*). This, you will say, is a very mechanical reason for œdema; nevertheless I believe it to be a true one. Carry on the idea, suppose the limb œdematous, and then just think how such a state of œdema must interfere by pressure upon the small arteries with the already enfeebled circulation. So you see there arises a very important question—how am I to get rid of the œdema? You will find no means so efficient to this end as a careful attention to the position of the limb. It should be slightly elevated, with the ankle just above the knee, and the knee just above the hip; so that gravitation may be allowed to have its influence from the foot to the pelvis, assisting slightly, or at any rate preventing any retardation of, the return of blood by the veins, whose walls receive such a feeble impulse from the adjoining artery. If you lift up the limb very much, you will find the feet die, just as do the tops of old trees when the circulation in the trunk is feeble, yet sufficient to maintain the lower branches in full foliage. There are no *venæ comites* to the arteries of the head and neck, except within the skull, where the arterial pulsations are perhaps as necessary to the venous circulation as in the depending lower extremities. For the blood in the venous trunks of the exterior of the head and neck, runs down hill, and, therefore, does not require any force from the accompanying artery to enable it to arrive at the heart. You will think I am laying great stress upon a very small matter when I thus urge upon you the exact position in which the limb should be placed, but I will give you a case in point. Some years ago I was called to see an old gentleman at Brixton,

suffering from a feeble ulcer on an œdematous leg. I found the limb resting upon pillows so that the foot was lower than the knee. The long continuance of the ulcer, notwithstanding abundance of physic and the application of varied ointments was the cause of my being consulted. All I did was to raise the foot and leg three or four inches, so as to let it lie a little up-hill upon an inclined plane; and my treatment was, I expect, heartily laughed at by the regular medical attendants. I am sure I did not raise it more than four inches, and in as many days from that time all the œdema was gone, the ulcer had put on a healthy appearance, and became quickly healed.

I explained just now that senile gangrene is accomplished without inflammation, and hence without the fluids that exude in inflammation; hence its accepted and significant name of "dry gangrene." This is to what the dresser refers when he says there was "no discharge from the toes." "No indication of a process of separation exists at any spot between the dead and living parts"—that is, no line of demarcation had been formed. What is a line of demarcation? It is an evidence that there is a part of the limb sufficiently nourished to be able to resist the gangrenous process. And, therefore, it is most anxiously looked for by the surgeon. Day by day he watches the mortification creeping on up the limb, and he knows not where it will end. At last a line of demarcation is formed and then the course of the gangrene is for the time arrested. A layer of lymph is put out at the extremity of the living part; granulations arise on it (or under it?); a healthy discharge occurs; and shortly the dead part is by this means isolated from the living portion of the limb.

I doubt very much if you get true healthy pus from pale granulations, although such is stated by the dresser to be the fact here; more likely a thin *puruloid* fluid was discharged from the granulating surface.

You will not fail to perceive in the report the fact that the continual contact of unhealthy putrescent fluids upon parts already in a state of depressed vitality has a very deleterious effect upon the lowly vitalized parts. And this of course forces upon us the question—how often should a gangrenous foot be dressed? Probably, whilst it is still dry, once, or at

the most, twice a week will suffice; but when a line of demarcation has formed, and much putrescent fluid is exuded, every other day will not be too often. In this latter case you must steer between two evils. Each time the part is dressed it suffers from the effects of exposure to cold; whilst, if the dressings be not frequently altered, the putrescent fluids will collect and kill the living neighbouring parts which are already in a state of low vitality.

I wish here to impress you with the idea of the depressing effect of general cold upon the circulation in this class of patients. A uniform temperature of from 60° to 68° Fahrenheit is about the best that can be maintained in the bedroom. Exposure to cold for one night only will often so depress the circulation that nothing can again rally the patient; a great extension of the gangrene rapidly ensues, and death shortly results. I well remember a remarkable case of this kind, and will relate it briefly to impress the point more strongly upon you. I was attending in Queen Square, Westminster, an elderly lady who was suffering from gangrene of the foot. It was in the midst of winter. I had treated the affection locally with oil and cotton-wool; and she was going on so well that I thought a good cure would be effected. A fire was kept continually burning in her bedroom, and a nurse attended to it all night. I saw her one afternoon, the gangrene had stopped, and there was a feeble granulating surface. As she was progressing so very favorably, I told her I should not call again for three or four days. That evening she felt so well as to dispense with the services of the nurse, who went early to bed. Soon after midnight the fire went out; the night happened to be suddenly and remarkably cold, and the effect upon the patient was most distressing. I was sent for in the morning; found her very low and pulseless; and upon taking off the cotton wool I discovered the greater part of the leg gangrenous. Spite of all our efforts she could never be rallied; that one cold night killed the patient. "The tissues seem gradually to be melting away;" the expression "melting away," implies molecular death of the tissues; that is, death of small microscopical particles, which disintegrate and are discharged. This is the ulcerative process; whilst if large portions of the tissue die, the

term mortification or gangrene is used to express the mode of death. With regard to one other paragraph, I must dissent from the explanation given by the dresser. He says the exposure to the air seems to determine the death of the tendons and ligaments—is this right? I think not; and I shall give you a different explanation. The skin, you must bear in mind, is better nourished than fascia, tendon, ligament, or areolar tissue; and muscle better, perhaps, than skin. It is in consequence of this relative vascularity, or relative organization, that gangrene attacks the areolar tissue, fascia, tendons, &c., more readily and more extensively than the skin or muscle; and not because of the exposure of the air. To prove this, take for instance a case of erysipelas in the arm. You then often get a wholesale sloughing of areolar tissue, for a time, beneath the integument, without any or with but little destruction of skin, and consequently without any exposure to the air. This is because the poison of erysipelas kills more readily the lowly vitalized areolar tissue than the comparatively vascular skin. Moreover, in erysipelas, when sloughing occurs, you find the fascia and tendons come away dead, whereas often on the surface of the muscles are healthy granulations. Tendon is nourished from three separate sources; one from its attachment to the periosteum of bone, another from its attachment to the muscle, and a third—the principal source—from the surrounding areolar tissue. So that if the areolar tissue die, one source of life is removed from the tendon, which consequently dies; not because it is exposed to the air, but because one of the modes of nutrition, and that the chief one, is cut off. Similarly in the case of thecal inflammation of the finger—say, in consequence of the sheath of the tendon being pierced by a foreign body—to how far does the tendon slough? Only to the palm of the hand generally. This is because whilst in its sheath, which extends as far as the palm, the tendon can receive but little nutrition, except from the periosteum at its attachment to the bone; but in the palm of the hand there is a quantity of areolar tissue, binding together the tendons, and from which they receive much vascular supply.

Concerning the details which are given of the mode of dressing the gangrenous foot, I may remark, in passing, that probably sperm-oil is a more perfect non-conductor of heat

than olive-oil ; hence I prefer it. Do not put on the bandages tightly ; if you do, you will kill the limb by stopping the circulation, and thus you will kill the patient. Do not imagine this a trivial point, for I have known of more than one such mishap.

Mention is made of the sufferings experienced by the patient whilst his limb was exposed to the cold air during the change of dressings ; this also evidently points to the good effect of warmth as against cold. Hæmorrhage is very rare in the progress of senile gangrene, at least I may say that I have not seen a case in which it occurred. Clots form in the arteries owing to the stagnation of the circulation in the dead part ; these clots extend into the arteries located in the living tissues. Upon the separation of the gangrenous portion, the clots are not displaced, because the force of the blood-current is too feeble to effect their dislodgment.

The post-mortem appearances of this clinical case must be shortly dismissed, since I have only just time to allude to them. You know the relation of the openings of the coronary arteries to the aortic valves. During the contraction of the ventricle the aortic semilunar valves are thrust outwards, so that the stream of blood issuing from the ventricle passes beyond the mouths of the coronary vessels of the heart. There is consequently, as a rule, no direct stream of blood into the coronary arteries ; how then are they filled ? or, in other words, how is the heart nourished ? Well, I believe chiefly by the elastic recoil of the first part of the aorta. If so, a diseased or thinned ascending aorta will send the blood in insufficient quantity to the muscular tissue of the heart, and at length lead to a degeneration of the coronary artery and of the heart muscles. A mere touch will enable you to perceive that the coronary vessel, which I have now on the table before me, is of stony hardness at some parts, owing to the deposition of atheroma on its walls. Such a vessel could not properly nourish the muscular substance of the heart. I believe then, the attenuated character of the aorta, which was found after death, was in this case the starting point of the disease. So that we trace the following sequence :—enfeebled aorta giving rise to atheromatous coronary arteries and fatty degeneration of heart ; fatty degeneration of heart producing enfeebled

circulation through the system ; diminished circulation causing gangrene in the foot, the part farthest removed from the central propelling organ of the blood.

One other point remains to be discussed—the question of the propriety of amputation. Should I have been justified in cutting off this limb? I think not. Where the heart force continues considerable, and the arteries only are diseased, by shortening the distance from the heart to the extremity by amputation high up in the limb, you may, perhaps, arrive at a point where the circulation shall be so vigorous as to be capable of healing up the large wound made by the amputation. In such a case an operation would be justifiable, as the gangrene would thereby be entirely cut off. But, as in the present instance, where the fountain of the disease is at the heart, I think one would not be justified in resorting to amputation. Had I taken off the leg there would probably have been an imperfect union of the flaps of the stump, which might even have also become gangrenous ; and in all likelihood the patient's death would only have been brought on the more rapidly.

LECTURE VI.

Fracture of eleventh dorsal vertebra ; death.

H. L—, æt 30, admitted at 11.30 a.m., December 12th, 1864. As he was walking along the floor, he fell through a trap-door to the ground, a distance of sixteen or eighteen feet. Alighted on his feet ; but there being some paving-stones piled on the ground, his spine was bent forcibly against them as he fell backwards, and he came to the ground powerless.

On admission, complains of cold ; is quite conscious. Has quite lost sensation, and the power of motion in his legs. Sensation perfect to within two inches of Poupart's ligament ; just above this is hyperæsthesia. An angular projection exists over lower part of dorsal region : it cannot be carefully investigated, as examination causes much pain. The projecting spinous process is firm and immovable, so that no crepitus whatever can be discovered. No priapism. He can move his

arms perfectly. Respiration natural. Says he has had a cough for a few days. Is put on a flat bed without any pillows; his water drawn off.

1.45 p.m.—Mr. Hilton orders him to be cupped on each side of the seat of injury; and to be placed upon his back with a flat board beneath him, and a pad to be put over the prominence. Four cupping-glasses are applied to the spine, and several ounces of blood withdrawn. A board is also placed beneath him, extending from shoulders to middle of sacrum; but after a few hours it causes him much distress, and is, therefore, removed. Catheter passes freely.

18th.—Sensation does not exist as low down by about three inches. Penis erect; but not turgid. On pinching scrotum, penis moves. Urine contains a little blood in last part that flows. Cough about the same.

14th.—Area of sensation diminished by over an inch. Excito-motor action in scrotum, but none in legs. Takes plenty of fluid food.

15th.—Has “pins and needles” sensation, first in right, then in left leg. No excito-motor action in scrotum. Urine neutral; blood comes away with last part. Cough worse. He takes, *Mist. Conii* co. $\mathfrak{z}\text{j}$, 4tis horis; et *Hyd. c. Creta* gr. iij, *Pulv. Dov.* gr. v, omni nocte.

16th.—Sensation has extended about an inch and a half downwards during the last two days. Lower limbs feel warmer than rest of body.

17th.—Cough less. Body and limbs of uniform temperature. To-day has lost the band-like sensation he has had in his abdomen since the accident. Urine still bloody. His bowels not having acted since admission, the rectum is examined according to Mr. Hilton's directions, and found full of fæces. Ordered, *Pil. Cal. c. Colocynth.* gr. x, statim; et *Enema commune*, post horas tres.

18th.—Bowels freely relieved of a large quantity of hard fæcal matter. He now passes his fæces involuntarily into the bed. Urine perpetually trickles away; therefore, a gum-elastic catheter is tied in. Urethra seems soft and lacerable. The catheter has been hitherto passed twice or three times a day by one of the dressers. Urine alkaline, ammoniacal, and turbid, and contains blood.

24th.—Very large bed-sores are forming, although water-pillows and lint have been placed beneath his buttocks.

27th.—Cough much worse; breathing laboured; mucous râles heard all over chest; face congested. Sensation again becoming less. Bed-sores extending.

January 1st, 1865.—Getting much weaker, and slightly delirious. Breathing more laboured. He evidently cannot live long.

2nd (twenty-first day after accident).—Dies this morning, struggling very hard for breath.

Post-mortem report.—Fracture through eleventh dorsal vertebra; lower fragment projecting backwards. The parts of the bone separated half an inch. Dura mater surrounded by a clot of blood. Cord cut through opposite site of fracture. Bladder and urethra inflamed. Two false passages in membranous part of urethra, passing over prostate, beneath the mucous membrane, and communicating behind.

GENTLEMEN,—I shall bring under your notice to-day a case of fractured spine. I shall deal with it in detail; and treat of the different symptoms as I can best manage in the hour allotted to lecture.

We have here then a man in good health, who fell. From some circumstances with respect to gravitation, or connected with the manner of his fall, he struck his back against some paving-stones; and then, on attempting to stand, could not do so.

On admission, his intellect was perfect, he was quite conscious; indicating that the brain was not involved. His feeling of coldness was merely one of the symptoms of collapse, which ensues from such a severe injury as this man had just received. The patient immediately after the accident experienced paralysis of motion and sensation in both legs. This much was certain, and I beg you thoroughly to apprehend its meaning. The cause of this paralysis must have been central and complete because the symptoms were unequivocal, and symmetrical on both sides. If the loss of nervous function from injury to the spine be unilateral, the cause is also unilateral and on the same side of the body; if it be bilateral, the cause is central, or it may, in a few cases, be equally bilateral. In

the present instance the attendant circumstances demonstrated decidedly that the cause was central and not bilateral. The case you see was very precise, so far as regards the symptoms. There was a fractured spine with double paralysis. Sensibility remained perfect to within two inches of Poupart's ligament on both sides alike; below that point there was absolute loss of sensation; whilst just at the point there existed increased sensibility, or hyperæsthesia. Proceeding, then, on our anatomical knowledge of the distribution of the cutaneous nerves, we might fairly suppose that the part of the cord injured was that opposite the eleventh dorsal vertebra. This would leave below the injured point three or four inches of healthy marrow, from which come off the nerves of the lower extremity. For you know the cord usually ceases opposite the body of the second lumbar vertebra. It is not, however, for various reasons, of so much importance in cases of fracture as in those of disease, to determine the exact site of the damaged portion of marrow. From the absolute loss of sensation in the legs you might have concluded that the cord was divided across; and we shall presently see that complete division had actually occurred. There was increased sensibility or hyperæsthesia of the skin about two inches above Poupart's ligament; that is, at the border line between the surface in which sensation was lost and that in which it was still perfect. Why was this? We know that in many of the diseases of the cord, where the marrow is inflamed, this increased sensibility of the skin—to which the nerves coming from the inflamed part of the cord are supplied—is a very common occurrence; but there had been no time for the supervention of inflammation in the present case, since the hyperæsthesia is reported as one of the symptoms found on admission. This symptom was, therefore, due to some other cause; and I think it may be explained thus:—You know that the lower you get in the spinal canal, the longer is the distance traversed by the nerves which have come off from the spinal cord before they enter the intervertebral foramina. Each pair of nerves is placed more obliquely than the pair above it, and—to speak more precisely with regard to the site of injury in this case—the lower dorsal nerves, after having left the cord, travel downwards an inch and a half or an inch and three quarters before leaving the spinal canal.

Now, if a nerve in leaving the canal be pressed upon, an alteration in the performance of its functions will, of course, take place; and this alteration is manifested by pain or increased sensibility, which is referred to the peripheral distribution of the nerve at the skin. In the present instance the nerve that came off from the cord opposite the tenth dorsal vertebra, making its exit from the spinal canal between the eleventh and twelfth, would be pressed on by the displaced fragments of the eleventh vertebra. Yet, as it was a healthy nerve, and belonged to an uninjured part of the cord, it could convey impressions which were perceptible to the brain. Instead, however, of ordinary sensation an impression of extreme sensibility was transmitted to the cord, because the nerve was pressed upon.

Injury confined to the bony portion of the spine is in itself a matter of no great consequence; yet such a case is always very serious because of the extreme likelihood that the cord is injured by the displaced bone. There is a strictly analogous instance in injuries of the head; we do not think very seriously of an injury of the skull alone, but should the subjacent brain be damaged, a much greater degree of importance attaches to the accident. In a case of angular projection like this, with so much deformity that the cord is necessarily pressed upon, and that to so great an extent that it cannot recover unless something be done, is it right to make any amount of extension so as to reduce the displacement? I will relate a case in point. Many years ago, when I was Mr. Key's dresser, a young man was brought in with fractured spine with extreme angular projection, and great deformity of the spine in the lower dorsal region, accompanied by immediate paralysis of all the parts below the injury; and suffering from extreme pain, which was no doubt due to pressure on, or to extension of, the nerves leaving the spinal canal at the seat of injury. Mr. Key thought it would be a fair case for extension. Several of us accordingly pulled at the man, some at his shoulders, some at his feet. We extended him slowly and gradually; Mr. Key made pressure on the displaced bone; and after a while it went back with a slight click. Thirty-three days subsequently the man died, and I was able to obtain his spine. It is this specimen (No.

1036, Guy's Museum), you will observe how very little is the displacement. The rule, then, I wish to lay down for your guidance is this: if in any case you arrive at the conclusion that the displacement is so great as to press upon and injure the cord so much that it cannot recover unless the displacement be reduced, then, I say, you are justified in employing forcible extension in order to reduce the fracture. In Mr. Key's case we had not the assistance of chloroform; in any similar instance now I should give chloroform, and then extend the patient very gradually and regularly, watching carefully for any change in the position of the fragments of the spine. By doing this you do not ensure the patient's recovery; but you do put him in a condition the most favorable for convalescence, by leaving the spinal marrow free for the possibility of recovery. So, in operating for strangulated hernia, in putting a ligature on an artery for aneurism, in raising a portion of bone pressing on the brain, and in surgical operations generally, you cannot say to the patient "when I have operated you will recover," but you can say, "by operating I place you in the position most favorable for recovery." In the present case the angular projection was there, but it was so inconsiderable that I did not feel warranted in employing extension. Had the displacement, however, been more marked, I should have attempted reduction; for several of my colleagues, since Mr. Key's case, have tried the plan and got the bones into good position. Unfortunately you cannot always depend on the amount of injury inflicted upon the cord by simply regarding the amount of displacement visible when the patient is first seen. The marrow may be quite crushed, yet no displacement perceptible. This is because the fractured bones damage the cord when first they are displaced; and the muscles acting harmoniously together, subsequently correct the temporary displacement, bringing the bones again into tolerably good position. Similarly, in a case of compound fracture of the leg, you will frequently find that the bone having projected through the wound, has been pulled back by the muscle before you see it—no surgeon having touched it; the displacement has been reduced by muscular force only.

This present is a case in point; the bones were here reduced by muscular action. For you see that the cord of this

man is cut completely across; yet upon the post-mortem table there was found only slight deformity; at any rate not sufficient to account for the complete severance, and consequent destruction, of the marrow which had taken place. Whilst upon this portion of the subject I must just advert to the slow distortion that obtains in angular curvature of the spine from caries—cases of which some of you may have seen, and a fine specimen of which I have here (No. 1006⁷⁵, Guy's Museum) for the purpose of contrasting it with the sudden deformity which results from accidents. The essential difference is that the deformity from disease is a gradual process, that it progresses slowly, and is accompanied by a remarkable adaptation of the bones. The vertebral canal becomes increased in size, and its angles rounded off, so that the sweep of the canal over the bodies of the vertebræ is not so sharp as you would suppose it to be, judging of the interior from the external configuration of the spine.

In books it is put—or rather, perhaps, I should say, used to be put at the time when I read text-books—that in cases of fractured spine there is retention of urine and involuntary discharge of fæces. This certainly is not altogether right. The retention of urine is principally due to paralysis of the muscular wall of the bladder, so that there is a want of power to expel the water; it is also probably in part due to some spasmodic condition of the muscles of the urethra. In respect to the bladder, then, the dictum of books may be relied on; but, as far as my experience goes, there is usually with fractured spine no involuntary passage of fæces for some time after the accident. In the present instance, as you will shortly see, the bowels were not relieved until the sixth day. The sphincter ani muscle has such an enduring force that the peristaltic action of the intestinal walls is insufficient to overcome it. This sphincter is supplied with a prodigious number of nervous filaments; and you may take it as a rule that a muscle is vigorous in proportion to the abundance of its nervous supply. I had the following case about two years ago in Cornelius ward. A man came in with fractured spine low down; he had loss of power over the great sciatic nerve, and from the very time of the accident suffered from involuntary discharge of fæces and re-

tention of urine. I said at the bedside that the cord at its terminal part would be found destroyed; and such turned out to be the case. For it is from the lowest part of the cord that the nerves supplying the sphincter ani take their origin; and if this part be intact, the involuntarily contracted state of the sphincter remains as in health. But if this lowest part of the cord be destroyed, then, of course, the nerves coming therefrom cease to act, the sphincter remains dilated, and unable to control the passage of fæces, which are henceforth discharged involuntarily by the continued peristaltic action of the intestinal walls. The case, however, that happened in Cornelius ward, was quite an exceptional one; and it is usual in fracture of the spine for the fæces to be subsequently retained for some time.

While passing the catheter in a case like this, I beseech you to be careful. The patient cannot tell you if he is hurt, for he has no sensibility of the urethra; and as he has no feeling, he of course cannot inform you of any damage you may be inflicting on him. You must, therefore, be excessively gentle, and yet withal use slight pressure; for you have to overcome muscular force, since there is usually spasmodic contraction of the urethral muscles. What sort of a catheter then ought you to use? Well, if you wish to pass a pin through any soft substance, you do not use the blunt head, but the sharp point; and *vice versa*. Now, in passing the catheter, your object is to prevent any perforation of the soft walls of the urethra. Use, therefore, the largest catheter that will enter the meatus; you are then much less liable to do any harm to the urinary passage. Pass the instrument slowly, carefully, and gently, never minding who may be looking on. Do not plunge the catheter in at once, because you think it looks well so to do. Moreover, I would advise you after a time, if not from the very first, to use a flexible catheter. At any rate, whatever apparatus you may patronise, *always leave the stilette out*, so that you may see when the catheter has entered the bladder, by the flow of urine which immediately ensues; when you ought to take care not to thrust the instrument any further. Take care not to depress the free end of the catheter always in the same direction; for, if you do, the vesical end of it will at each introduction touch the same part

of the bladder; and you must remember that the bladder is already in a deteriorated condition, and mechanical injury will rapidly cause it to ulcerate. Here is a specimen in illustration (No. 2096, Guy's Museum); it came from the patient whose spine was, as I just now related, extended by Mr. Key. The man died with ulceration of the bladder and pericystitis; I am the culprit. I used to pass a catheter thrice daily for him; once I would depress it between his legs, once I turned it to right, and once to the left; and this plan I pursued day after day. After death were found three ulcerated patches at the exact spots where the point of my instrument touched daily. To impress this same topic yet more strongly upon you, I will relate another case. A man used to pass a catheter for himself daily for years. He would stand with his back against the wall, employed a catheter with a stilette in it, so as not to wet his breeches, and he informed me that he thought he knew when the catheter was in the bladder, by a curious sensation he then and there experienced. He then withdrew the stilette, and the water passed. One day I was sent for in a great hurry to see him; I found him dying from peritonitis, brought on by perforation of the bladder. I examined the body after death, and passed a catheter in the direction that it had pursued for so many years. Upon opening the abdomen, I found the point of my catheter pressing against the very spot to which the instrument had come time after time. The bladder at that spot was ulcerated and perforated by a small hole, through which the urine had passed, setting up the fatal peritonitis. It may seem a refinement of observation to say, "pass a catheter without a stilette;" but indeed it is not so, because, if this man had adopted the plan, he would, by the escape of urine which then ensues immediately upon the instrument reaching the water, have known at the earliest time of the entrance of the catheter into the bladder; and he would not have pushed the instrument any further until he felt the "peculiar sensation" which told him to take out the stilette. But, to proceed with the present case. There was on the day following the accident, an increased loss of sensation; in other words, the paralysis extended higher up the body by three inches. You cannot suppose the spinal marrow to be cut across, as it was here, without the occurrence of a good deal

of bruising. Now, when any external portion of the body, that you can see, is bruised, it rapidly becomes inflamed and swollen, just so when the invisible spinal cord is bruised, it soon inflames, and becomes swollen from the infiltration of serum and blood. Therefore, on the next day, we find that the nerves coming from the healthy part of the cord just above the seat of injury, are in their course pressed upon by the swollen state of the injured portion, which interferes with the transmission of sensation from the skin to the spinal marrow, and constitutes a loss of sensibility. After a few days, when the effused matter is absorbed, is it not equally explicable that the sensation should return to the parts of the skin supplied by these nerves? Such return of sensibility was experienced in this case after four days.

On the day after the accident, the penis was erect. This state is dependent on spasm of the muscles controlling the vascularity of the organ, and the muscular spasm again is caused by irritation of the pudic nerve supplying the erector muscles. The erection of the penis has four distinct relations to fracture of the spine. It may occur as a symptom directly after the accident; or may supervene also as a symptom in the course of a day or two. In a third class of cases, erection may be capable of being brought on by pinching the scrotum, and by other modes of irritation, acting just as in health; this is the case where fracture has occurred high up in the spine. Fourthly, there may be a total inability from the first to arouse erection. In the first three instances, the lowest segment of the marrow is entire; whilst in the fourth case, it is irretrievably damaged, so that no reflex action whatever can be excited in it. When erection occurs immediately after an accident, it is due to the excito-motory function manifested in the portion of cord below the seat of injury being inordinately excited, now that it is deprived of the controlling influence of the brain. In the second class of cases, the phenomenon in question is caused by the irritation of a little clot of blood which has collected in the cord; or by the extension *downwards* from the seat of injury (a rare occurrence) of inflammation. The erection which this man experienced must be classified in the second division I have named. Why was there no erection of the penis at first? and why did it come on afterwards? I

cannot say decidedly ; probably it was due to the presence of a little clot of blood, &c., in the gray matter below the seat of injury; or it might have been from inflammation extending downwards in the cord. In order to see whether my supposition of the lower part of the marrow being still entire was true, I pinched the scrotum. The skin of this part, you will remember, is supplied by the superficial perineal nerve that comes off from the cord at the same spot as that other branch of the pudic nerve which causes erection of the penis. When I pinched the scrotum, the penis moved, showing that reflex action could be excited, and that the central portion of the spinal marrow below the injury was consequently in a state of integrity. You may, in these cases, by pinching the scrotum, sometimes excite enough reflex action to get half an erection. This proves that the plethora of the penis is due to muscular contraction alone, for in cases of fractured spine the erection is usually unaccompanied by any sexual desire, and the patient has no feeling at all in the matter. By-and-bye, pinching the scrotum causes no excito-motory action, because by the continued repetition of the experiment you exhaust the functional power of the gray matter of the cord for some time. Suppose a case of fractured spine to be brought in: Smith goes to the bedside, and by pinching the scrotum of the patient, causes him an erection of the penis; this experiment being repeated by several others. He then meets Jones, and says, "You go to such and such a ward, and you can get a beautiful erection in that case of fractured spine." Jones hurries off, and upon putting the parts through the same ordeal, meets with no like result—the penis will not become erect. He says, "What a fool Smith was," and walks savagely away. Next day he meets Smith again, and the latter takes him to the bed, pinches the scrotum, and the penis is moved. Now, why is this? The continued irritation of the excitor nerves causes the exhaustion of function of the lower portion of the marrow, so that for a while you lose the effect of irritation. But give the medulla time to regain its "physiological" nutrition; it will then recover itself, and its functions be renewed. On December 13th, the urine was bloody. When you see this, say to yourself, "Well! I have injured the urethra in the passage of the catheter." One dresser says I did not do it;

another is sure that no damage was inflicted when he passed the instrument, and so on. That some injury was inflicted, the post-mortem examination revealed; for two false passages existed, which ought not to have been. The first time you see blood in the urine, depend on it at that time you have injured the urethra. With the more blood there is the greater amount of harm; and if no blood at all, then no material damage has been caused.

I doubt the assertion of the dresser that the patient had the sensation of "pins and needles" in his legs; or at any rate I do not feel inclined to lay much stress upon it, for you know that if a man has had his leg taken off he frequently feels the same sensation in the departed member, no matter where the preparation may happen to be.

The urine was neutral on the third day; and we shall presently see that it became alkaline. This change in the reaction of the urine is certainly an ordinary occurrence in cases of fractured spine. Three circumstances at the least tend to this result. Firstly, the urine itself decomposes within the bladder, owing to its retention within that viscus. And this change of the urine will be much accelerated by its admixture with blood, which, moreover, you will remember, is of itself alkaline. Secondly, the alkalinity is partly due to a loss of nervous power in the wall of the bladder, by which the mutual relations that exist in health between its mucous coat and the contained urine are disturbed; but this point I cannot now go into. If the decomposition be very speedy, it will probably depend on some diseased condition of the mucous coat of the bladder. But, thirdly, the urine after a while is alkaline when first excreted by the kidneys. Some years ago, to determine this point, I examined the excretion in the kidneys themselves in some cases of fractured spine. Having previously let all the blood drain away from the open vessels of the kidney, I cut across the uriniferous tubules in the cones, so as to avoid all fallacy from the retrograde passage of urine through the ureters; and then upon applying the test-paper to the cut surface, and squeezing out the contained excretion, I obtained a distinct alkaline reaction.

The *Mist. Conii Co.* was ordered to quiet the cough; the *Hyd. c. Cret.* was given in reference to any inflammatory

action of the spinal marrow ; and the Dover's powder to comfort him at night.

In a case where softening is going on in the cord, you can mark its progress with exactness ; and it is your duty to do so each day. Note precisely the spot on the skin to which sensation extends, and then make an impress there carefully with nitrate of silver. To-morrow make another mark at the boundary line of the then sensible part, and do so from day to day. You thus can note accurately the amount of injury that is taking place in the spinal marrow. Do all this with precision, and then if the marks are arrested at a certain line, you may be sure that the inflammatory mischief is going to stop there, and that it will not progress ; if the marks, on the contrary, go up and up, you know the mischief is also still ascending.

This man's bowels had not been opened since admission, so on the fifth day I requested the dresser to see if the rectum was full ; such he reported to be the case. I then ordered a purgative of colocynth, to increase the diffuence of the fæces by augmenting the liquid secretion from the intestinal walls, and to increase the peristaltic intestinal action, in order that it might overcome the resistance of the sphincter ani, and so cause an evacuation of the contents of the large intestine. The same end would be brought about by the administration of the simple enema in three hours' time. Had the pills been given before the dresser examined the rectum, an idea of the endurance of the sphincter would have been impressed upon him through the medium of his nose as well as by his other senses, for his shirt-sleeves would have been deluged with liquid fæces immediately that his finger had overcome the contraction of the sphincter ani, since it is the rigidity of this muscle only that prevents the bowels from being opened.

After awhile you do get involuntary action of the bowels, because the lower segment of the cord of which I was just now speaking is deprived of its functional power through exhaustion ; the nerves that supply the sphincter, and come off from that part, cease to convey reflex impressions, and thus the sphincter no longer acts. A continual contest for the mastery (intestinal warfare) exists between the peristaltic action of the bowels and the contracted sphincter ; up to this point the

spincter has been victorious. But as soon as it ceases to act there is nothing left to antagonise the peristalsis, which continues and so forces the fæces to pass involuntarily from the anus.

On the twelfth day this patient had large bed-sores. Why so soon? Several circumstances contribute to this. A man suffering from paralysis is very liable to extensive and generally uncontrollable bed-sores. They are sometimes recovered from; but if the sloughing be very extensive, they are usually fatal. The cellular tissue beneath the skin sloughs away, then the skin goes; the exposed part of the sacrum soon dies, and a passage is opened into the spinal canal to the membranes of the cord. Inflammation extends upwards along the arachnoid and pia mater; and death shortly results. What induces the bed-sores? First, there is a diminution of vitality in the part from the loss of nervous influence. You may think this a hypothetical cause; but it is not so. Remember the case I have recorded in which an exostosis pressing upon the ulnar nerve led to sloughing gangrene of the little finger. Secondly, pressure always continued on the same parts. If we sleep, we turn in a short time and get relief in that way. But the man with fractured spine does not feel the pressure, and so has no change of position. The persistent pressure causes a defective supply of blood to the areolar tissue, fascia, &c.; these parts slough first, then the skin gives way, and the case hurries on rapidly to a fatal termination.

This man got weaker from day to day; and on the twenty-first day after admission he died, apparently from suffocation, caused by general bronchitis.

At the post-mortem examination there was found a fracture through the eleventh dorsal vertebra, with slight projection backwards of the lower fragment; but not enough, as I explained just now, to account for the complete severance of the cord which had taken place. There was a much greater displacement of the fragments produced by the injury, and through this the cord suffered so extremely; subsequently, the muscles adjusted the fragments in the better position that they were found to occupy on the post-mortem table. Time will not permit me to dwell minutely upon the various lesions found in the body; I can only refer to two. As regards the two false passages in

the urethra ; in any similar case you will best avoid them by following, during the passage of the catheter, the advice I just now gave you. Here is the cord ; it is being soaked in chromic acid, so that when sufficiently hardened it may be microscopically examined. If you look at it attentively, you will observe that it is swollen just above the seat of injury. I have now cut it transversely in these four situations. You can see, even with the naked eye, that just above the injured spot the gray matter is disorganized by inflammatory deposit ; whilst at the cut above this the cord is less diseased ; and at last I come to a part where apparently to the unaided vision the marrow is quite healthy. This, however, must be determined by the microscope.

CASE OF RUPTURED POPLITEAL ARTERY.

BY ALFRED POLAND.

THE following interesting case is well worthy of record, inasmuch as there are several peculiarities not generally met with. It forms another variety to those recorded by me in a former number of our 'Guy's Hospital Reports.'

James T—, æt. 28, a farmer's labourer living at Abbey Wood, and accustomed to much walking on ploughed and irregular ground, about twelve miles daily. He was admitted into Guy's Hospital under my care on July 5th, 1865, with a large, hard, and ill-defined swelling in the popliteal space of the right leg. He stated that about three weeks ago, after walking, he felt a queer numb sensation in his foot, which he could not account for; and in about three days after, he was forced to leave off work in consequence of most severe pain in his ankle. From that date up to the period of his admission, he was laid up. He had noticed the back of the knee to be much swollen.

On admission the whole knee and leg of the right side was much enlarged, and the leg and foot devoid of sensibility; there was no pulsation to be felt in the anterior or posterior tibial arteries. The temperature of the limb was higher than that of the opposite side. The swelling in the ham appeared to be of the size of a very large fist, but its outline could be with difficulty traced; it was elastic and partly firm, and in places rather nodulated; and the tumour was evidently seated under the heads of the gastrocnemius, which seemed to cause

much pressure. An indistinct pulsation could only be felt, but on pressure of the femoral artery above, some slight diminution took place, and on removal of the pressure the tumour returned to its original, firm, elastic state.

Respecting the diagnosis of the case; although the history was not very satisfactory, I pronounced it to be one of rupture of the popliteal artery. Some doubts were entertained whether such a large artery could give way by the simple act of walking; and from the fact of the absence of any previous tumour in the shape of an aneurism, a suggestion was thrown out whether it was not a rapidly growing fungoid mass, pressing partially on the artery, and receiving its pulsation from it. Again, it was found that pulsation in the anterior and posterior tibial arteries of the left leg could not be felt; rendering the case still more complex. However, the condition of the limb, the situation of the tumour, and the resemblance in all respects to other cases of ruptured popliteal artery caused me to venture upon a decided opinion.

Progress and Treatment.—The leg was raised on a pillow and wrapped in cotton wool, and a grain of opium administered three times a day.

On the following day, July the 6th, sensation returned in the affected leg and foot, but ceased at the toes; but on the next day sensation in the limb was fully established.

On July 10th a slight blush appeared over the leg, very much like erysipelas; feverish disturbance; the pulse 108. He was ordered quinine and porter.

11th.—Great restlessness; complaining of a good deal of pain in the leg and foot. There is a great change in his countenance since his admission; he looks anxious and the features are pinched. To continue the quinine, and to have five grains of Dover's powder at night. The leg and foot to be covered with lint dipped in lotion of belladonna.

12th.—The pain in the foot and leg very severe; had an attack of diarrhoea, which was speedily checked.

From this period to the end of July he continued to alternate very much, some days better and some days worse. The limb, during the whole of this period, remained in much the same condition, occasional severe pains and attacks of inflammation, and at one time threatening suppuration.

Spirit lotions were applied and the general health kept up. The tumour ceased pulsating and did not diminish in size. There were no signs of gangrene, nor was there any want of heat or sensation.

In the early part of August, constitutional symptoms of very severe character set in, and the man was becoming exhausted. It was resolved to amputate the limb when an opportunity arrived. Threatening gangrene attacked the calf of the leg, and amputation was performed on August 22nd. The stump healed well, and he left the hospital convalescent on the 17th of September.

On examination of the leg, the parts about the knee-joint and the tissues of the leg and foot were infiltrated with serum, almost puriform; the gastrocnemius muscle was expanded, and overlapped and girt the subjacent mass; some extravasated blood was effused under the muscles of the leg as far as near the ankle, but only in thin detached patches, not enough to produce any pressure. The whole of the parts involved in the tumour were taken entirely out from off the lower end of the femur, the posterior ligament of the knee-joint, and back of the head of the tibia. The dissection was entrusted to Mr. George Roots, under my superintendence, and we were enabled to display a most remarkable specimen of a ruptured artery. The popliteal vein and the nerves were perfectly entire. The joint and bones were quite natural, and had sustained no injury whatever. The popliteal artery and its bifurcation into anterior and posterior tibials were isolated in conjunction with the thin globular tumour.

Space precludes our making any more detailed remarks.

The accompanying plate, with the explanation, will sufficiently represent the condition. The drawing is the exact size of the dimensions. (See Plate.)

This case tells its own tale—a ruptured popliteal artery in a vertical direction, and to a very large extent; and this severe laceration produced without any violence whatever, or any other injury. The only explanation is, that the artery was in an atheromatous condition, and thus rendered more easily lacerable. The tissues of the leg and foot were in a state of fatty degeneration, and the bones very oily.

The following additional cases have been appended; although

meager in detail, they are interesting ; the notes are from Dr. Wilks' ' Inspection Book ;' the reports of the cases not having been recorded.

CASE 1.—W. H—, æt. 49. Cornelius Ward, October 2nd, 1863. Admitted August 5th, and died October 1st. This man fell and dislocated his knee and otherwise injured his leg. Gangrene set in, and the limb was amputated. It was then found that the popliteal artery was quite closed by coagulum. Body very fat ; lungs healthy ; heart, right and left auricle, excess of fat in muscle, tissue fatty ; liver fatty.

CASE 2.—Injury to leg ; laceration of popliteal artery ; gangrene. W. B—, æt. 36. Cornelius Ward, October 5th, 1863. Admitted October 2nd, and died October 5th. This man was run over a day or two before admission, a wheel having passed over his legs. The right knee-cap was broken, and the left leg considerably injured. It was swollen and black, as if gangrene was commencing. A wound existed near the knee, which entered the joint. The gangrene extended, and the man became delirious and soon died.

The left leg was black, and much swollen ; the joint was opened, and there was much exudation of dirty fluid around it. The popliteal artery was exposed, and it was found not to be ruptured externally, nor was any blood effused around it, but it was observed to be contracted to about one inch of its length. On removing the vessel and opening it, it was seen to have undergone a transverse laceration, by which its inner and middle coats were completely separated, but leaving the external cellular coat entire. This had contracted in itself to the smallest size, and was full of a firm coagulum. The femoral, for some distance above, was also full of firm clot. The separation of the two ends of the vessel was to the extent of an inch. Lungs congested and spotted on surface ; no inflammation, but probably death due to blood-poisoning.

CASE 3.—C. H—, æt. 29. Job Ward. Mr. Durham. Admitted October 29th ; died, November 11th. About six weeks before admission he fell from a haystack, and hurt his leg. Soon afterwards there was found an aneurism, or pulsating

tumour in the ham. Compression was used, in order to arrest the current of blood, but the swelling became larger, and he was then sent to the hospital. A large diffused aneurism existed below the knee of left leg, and extended upwards and downwards. The man at the same time was very ill. The femoral artery was therefore ligatured by Mr. Durham on the following day. The man gradually got feebler, and it was pretty evident that he had pyæmia.

Body much wasted.

The limb.—The cuticle was abraded in various parts, and a few bullæ were present, indicating in all probability an approaching gangrene; also some inflammatory oedema. The parts around the injured spot were in a state of softening and slough, and some suppuration in neighbourhood. The knee-joint contained purulent fluid. In popliteal space was a large coagulum of blood, softening, and of fetid odour. On removing it a large space was left among the tendons of the muscles, and running through the lower part of it was the artery. On the side towards the bone its walls were deficient for the length of one inch or more. It appeared as if half the circumference had been cut away. On dissection no proof of aneurism, but it appeared as if the artery had been simply lacerated.

Pleura.—About a pint of fluid in left chest—purulent serum; the lower lobes of lung covered with a layer of lymph.

Lungs.—Lower edge of left consolidated in various degrees; red and gray hepatization, some exuding a purulent matter. Few other patches of similar character, with softening, as if about to form abscess.

Liver very fatty; gall-bladder unusually distended with a pale watery bile.

Spleen healthy; *kidneys* healthy; *heart* healthy.

REFERENCE TO PLATE.

This plate represents the deep-seated, anterior or articular view of the popliteal, and anterior and posterior tibial arteries, having a large tumour attached, extending outwards towards the cutaneous surface of the popliteal space.

- a.* The popliteal artery, slit up in its course along the tumour.
- b.* A vertical rupture through all the coats of the artery; the upper and lower margins enlarged and smooth.
- c.* The sac formed of condensed cellular tissue, under an expanded gastrocnemius; in parts of an irregular nodulated appearance.
- d.* The posterior tibial artery.
- e.* The section of the tumour, showing its formation from coagulated blood, of the consistence and colour of black-currant jelly. There is not a particle of fibrine.
- f.* The anterior tibial artery.

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POISONING WITH FUNGI.

FATAL EFFECTS OF THE AMANITA CITRINA ON A WOMAN AND CHILD.

By ALFRED S. TAYLOR, M.D., F.R.S.

IN August, 1865, Mr. Gross, Coroner for Ipswich, consulted me in reference to a case of poisoning by fungi. An inquest was held by him on a girl æt. 6, who had died after a short illness. According to the evidence of the mother, Elizabeth Edwards, the child was very well up to the evening of Saturday, July 29th. She then went on to say—"I gathered some plants which I thought were mushrooms (like those produced), I found them growing under some trees. I fried them and ate them for supper, with my two children. I ate only a piece the size of my three fingers. The child (deceased) ate two pieces the size of half-a-crown each. This was about 8 p.m. At 3 a.m. on the following morning (Sunday, July 30th) the deceased was taken violently ill, and I and another of my children were taken very ill shortly after. The deceased was seen by a medical man about 4 p.m. on Sunday afternoon. He gave us all some medicine, but the deceased never rallied ; and died about 1 p.m. on Monday afternoon. I and the other child are now recovering."

Caroline Eade said—"I came to this house about 10 a.m. on Monday morning. The deceased was then quite insensible, and was dying. The deceased died at 1 p.m. that day. The deceased never became sensible after that time."

Hannah Edwards, grandmother to the deceased, said—"I came to deceased on Sunday last at noon. The deceased was then very sick, and vomited violently. The deceased did not purge much, but was very feverish indeed. The deceased was quite sensible, and took an emetic on Sunday afternoon. The emetic acted freely. The deceased continued sick and feverish all Sunday night. On Monday morning early it appeared better. About 6 o'clock in the morning it was taken with convulsions and became insensible, and never rallied until its death at 1 p.m. on that day."

Mr. Lloyd, assistant to Mr. Goreham, surgeon, said—"I was called to see the deceased on Sunday last about 4 p.m. I went directly, and found the deceased had eaten some fungus, like mushroom. The deceased was very feverish and thirsty with strongly *dilated pupils*. There were violent pains in the stomach, and the throat was constricted; there was vomiting and purging. I prescribed an emetic. The pulse was very hard. I saw her again on Monday morning at 7.30 a.m. She was then convulsed and in a state of insensibility. I have seen the fungus produced, and I have no doubt that it was the cause of the illness and death. I tried warm baths, mustard poultices, and other counter-irritants. The girl never rallied, but continued insensible till her death. I observed the same symptoms, except the convulsions, in the mother and the other child. The mother and this child will, I believe, recover." Verdict—"Accidental death from eating poisonous fungi."

The mother herself, although at the date of the inquest apparently recovering, died from the effects of the fungi, on the 3rd August, the fifth day after eating them.

Remarks.—Mr. Gross sent to me several fungi gathered from the spot whence these poisonous vegetables had been taken. On examination I considered them to belong to the species described by Orfila as the *Oronge cigue jaunatre*, or the *Amanita Citrina* of Paulet. This mushroom is represented in the illustrations of poisonous fungi appended by Orfila to his 'Leçons de Médecine Légale.' It probably corresponds to the *Agaricus Citrinus* of Withering. The pileus was obtuse, smooth, and of a dirty yellow colour. The fungus had a very offensive smell, resembling that of putrescent animal matter,

and when received it was in a state of putrefaction. These noxious fungi were wholly unlike the ordinary edible mushroom (*Agaricus campestris*), and the gathering of them for such, showed a deplorable ignorance on the part of the woman, leading to the death of herself and her child. The poison of this fungus, whatever may be its nature, is proved by the observations of Orfila to be of a most virulent kind ; it is fatal to animals as well as man, and in some cases its virulence appears to be increased by the mode in which it is treated. It appeared, from the evidence at the inquest, that neither the mother nor the child had eaten a large quantity. The action of the poison was of a mixed character, at first being that of an irritant, producing vomiting and purging, while in the last stage it affected the brain and spinal marrow, producing stupor and insensibility, and in the child convulsions. The cooking of these fungi did not destroy the poison, as, although before they were eaten they were exposed to a high temperature in frying, they still retained all their noxious properties.

Other facts to be noticed in this form of poisoning are—first, the length of the interval before symptoms appear ; and secondly, the length of time before death takes place. In these three cases at least *seven hours* had elapsed before any symptoms of poisoning manifested themselves. This indicates a slow rate of absorption, and therefore increases the chances of recovery by early treatment. So far as it appears, no application for medical treatment was made by the woman until twenty hours after the fungi had been eaten, and thirteen hours after symptoms of poisoning had first shown themselves. The employment of mustard and water or other emetics at an early stage would speedily expel the substance and relieve the patient. Had this treatment been resorted to in these cases so soon as the first symptoms of irritation showed themselves, it is probable that it would have been effectual in saving the lives of both. As it was, the remedial measures could have no effect whatever on the poison already absorbed into the blood.

The length of time which elapsed before death is also worthy of remark, as it corroborates what has been observed in other cases of poisoning by fungi. The death of the child (æt. 6) took place forty-one hours after the noxious meal, and

thirty-four hours after the commencement of symptoms. The mother apparently recovered, and was able to give her evidence at the inquest on her child, but she relapsed, and died on the fifth day.

It does not appear that any post-mortem examination was made in either case. The fungi sent to me were in too decomposed a state to allow of any satisfactory results being obtained by a chemical analysis. Chemistry has hitherto thrown but little light upon the nature or properties of the poison existing in these noxious vegetables. In some cases it appears to be a volatile principle; and in other instances a brown, soluble, uncrystallizable solid has been obtained, to which the name of *amanitine* or *fungine* has been given, although the latter name has been also inconsistently applied by Vauquelin to the cellular structure of the fungus.

A portion of the fungus partially dried was submitted to examination; it weighed nineteen grains. It was of a dark colour, and had an offensive smell, but the pileus retained a dingy yellow hue. It was cut into small pieces, and digested in distilled water at a gentle heat. A liquid of a brown colour and of an acid reaction was thereby obtained. A small quantity of acetic acid was added, and all that was soluble was extracted by a gentle heat. The liquid when filtered was clear, but dark-coloured, and had an offensive smell. It was copiously precipitated by a solution of tannic acid, but was scarcely affected by the chloriodide of potassium and mercury (codo-hydrargyrate of potash). These results showed that there was no alkaloid, but some vegetable principle. The remainder of the liquid was rendered alkaline by potash and shaken with three volumes of ether. On decanting and evaporating the ethereal liquid, a small quantity of a white uncrystalline residue was obtained. This was not changed in colour by nitric or sulphuric acid; and on adding to the mixture with sulphuric acid, a crystal of bichromate of potash, green oxide of chromium was only slowly set free. At present, the only reliable test for the poison is that which is based on physiology—the effects produced on animals by a portion of the extract of the fresh fungus.

In spite of the difficulty which thus exists in establishing the nature of the poison by specific chemical properties, when

life has been destroyed, there can be no doubt of its existence. Physiological experiments on animals have shown that the *Amanita Citrina* contains a virulent poison, acting with equal energy upon man and animals.

Orfila administered to a dog two of these mushrooms (*Orange cique jaunatre*), in a pulpy state. In eleven hours the animal, which had up to that time been apparently well, was seized with vomiting. A few hours later there was purging, a general trembling of the body with convulsive movements, and the animal lay down. In this state it remained several hours, evidently suffering at intervals severe pain; it became insensible, but was at times seized with convulsions. Some vinegar given to it roused it only for a short time. The dog died thirty hours after the introduction of the poison. On opening the body the lining membrane of the stomach presented numerous red patches; the mucous and muscular coats of the intestines were destroyed, and the serous coat was marked by livid red spots. Not a trace of the mushrooms could be found in any part of the alimentary canal.

Half an ounce of the *Amanita Citrina*, mixed into a pulp with a little water, was given to a large dog. The animal was seized with a violent fit of vomiting, and threw up a portion of the fungus. This was followed by violent vomiting and purging, resembling a severe form of cholera, with collapse. The animal died twenty-four hours after taking the poisonous fungus. The interior of the stomach presented numerous red points.

Other experiments on this fungus conclusively showed that the poison was not volatile, and did not admit of separation by distillation. The liquid distilled from the fungi bruised with water was given to several dogs, and no symptom of poisoning was observed in any of them; but the solid residue of the distillation, even in a small dose, destroyed every dog to which it was given. Death did not take place until twenty-four hours after the introduction of the poison, and was preceded by the symptoms above described. It is also worthy of remark that even under these circumstances none of the animals experienced symptoms until after the lapse of ten hours. On inspection there were numerous red points on the lining membrane of the stomach, and the inner surface of the in-

testines was covered with thick viscid matter, of a yellowish colour.

Orfila further proved that the aqueous extract of this fungus caused death in less than twenty-four hours, and a portion of one dried in an oven was equally poisonous. Even the water in which some of these fungi had been simply allowed to soak for several hours, when given to a dog, produced severe pain, with bloody purging; but the animal recovered. Other dogs were killed by portions of the fungus which had been thus macerated in water. An alcoholic extract of thirty-four grains of the dried fungus proved fatal; but the residue had lost its poisonous properties, since it produced no symptoms in animals (Paulet). Two facts are hereby established—that the poison is fixed at a moderate temperature, and is quite soluble in alcohol and water.

Not many observations of the effects of this fungus on man are to be found in works on toxicology. The following, however, are quoted by Orfila. Six persons in a family ate at dinner a portion of the *Amanita Citrina* in a stew. At three o'clock in the morning one of them, the wife, suddenly awoke with a feeling of nausea; this was followed by vomiting of a portion of her dinner, but without pain, while at the same time it was observed that she was in a state of stupefaction, from which she was only roused by the act of vomiting. An emetic was given to her; this operated quickly, and she was greatly relieved, but she did not entirely recover for a period of three weeks. A young man and a girl, who did not vomit, and had no emetics given to them, died after suffering from the usual symptoms. Two others, who were treated in an early stage, recovered in three weeks. The husband suffered from an attack resembling cholera, accompanied with severe cramps in the feet and a retraction of the limbs. There were no febrile symptoms. The whole of them, excepting the husband, were in a continuous state of stupefaction. Symptoms of a similar kind, as a result of eating this fungus in food, occurred in two persons at Suresne, and in two others at Melun. Three of them, who received no medical assistance, died. In another instance five persons are reported to have perished from eating the fungus. (Orfila, 'Toxicologie,' ii, p. 663.)

The symptoms produced by poisonous mushrooms may be thus summed up. From five to ten hours after the noxious meal, during which probably the poisonous principle in a state fitted for absorption, is being separated by digestion from the cellular tissue in which it is contained, the person suffers from colicky pains in the stomach and bowels, and these become more and more severe. There is vomiting and purging, preceded by abdominal pains, great thirst, febrile heat, a sensation of heat in the abdomen, and a small, hard, and frequent pulse, with difficulty of breathing. Cramps and convulsions with stupor and insensibility follow, although, according to Orfila, the senses are often retained, and the person, in the midst of severe suffering, is conscious of the approach of death. The duration of a case when it proves fatal varies from two to four, five, or six days; the person sinks, apparently exhausted by the severity of the pain and the convulsions. In other cases vertigo, delirium, stupor and coma, are followed by symptoms of irritation in the stomach and bowels; and in some few instances these nervous symptoms show themselves early, without any previous irritation of the stomach and bowels. The person dies apparently in a comatose or apoplectic condition.

The state of the pupils of the eyes does not appear to have sufficiently attracted the attention of those who have had an opportunity of observing cases of poisoning with fungi. In the case of the child which forms the subject of this paper it was observed by the medical gentleman who was called in that the pupils were *dilated*. This is important, as hitherto this condition of the pupils has been considered to be strongly indicative of poisoning with atropia, daturia (considered by some chemists to be the same alkaloid), and hyoscyamia. Other symptoms, it will be remarked, closely resemble those of poisoning by belladonna—*e. g.* the stupor, the feverish state of the skin, the great thirst, the sense of constriction in the throat, &c. Unless a practitioner is on his guard, in a case in which no accurate account can be obtained of all the articles eaten at a meal, he may thus be misled, and come to a wrong conclusion. Giddiness, dimness of sight, and singular illusions of sense, have been observed among the symptoms, and the person on walking has staggered as if intoxicated.

It is well known that symptoms of poisoning by fungi may

be mistaken for the effects of arsenic, and circumstantial evidence may sometimes tend to support this erroneous conclusion. Mr. Image, of Bury St. Edmund's, has communicated to me the particulars of a case of suspected criminal poisoning, in which it is probable that noxious fungi were really the cause of death. In August, 1865, a child, aged two and a half years, the son of a labouring man, died suddenly. Mr. Image examined the body, and found that the child had died from the effects of arsenic. Another child, aged four, a member of the same family, having died rather suddenly about the same time, the body was examined by Mr. Pearce, who found some suspicious patches of inflammation in the stomach. The analysis in this case was also intrusted to Mr. Image, but there was no arsenic, and no trace of any noxious animal substance either in the stomach or the tissues.

It was clear, therefore, that this child had not taken arsenic, and had not died from the effects of this poison, and it transpired at the second inquest that the children had partaken of mushrooms within a short period of the death of the deceased. It appears that the mushrooms were procured by the mother from a plantation, and were of three different kinds; her children could get them at any time, and they had all eaten mushrooms at different times. The symptoms arising from the mushrooms in these cases are not stated, but it is not improbable that among some which were wholesome others of a poisonous nature were gathered by the children and eaten by them. A verdict was returned in accordance with this view, In the course of his evidence Mr. Image stated that there were some small granules in the stomach of the deceased child, which, when subjected to the microscope, had the appearance of sporules of fungi. Some of them had grown, and were about the size of a pin's head, and by the 30th August they had grown to three or four times their original size. The question then occurred to him whether the child might not have died from eating poisonous fungi. The patches of inflammation found in the stomach and the entire absence of mineral poison from the tissues were consistent with this view of the case.

It may be remarked of those cases generally that, as some days frequently elapse before death, and there is often violent

vomiting and purging, it will not be easy in a case of poisoning by fungi to detect in the stomach or bowels any portion of the fungus which has caused the mischief. In reference to the case of the dog poisoned by Orfila to which the fungus had been given, not a trace was found in the alimentary canal thirty hours after the administration, at which time the animal died. From the size and bulk of these fungi, it might be supposed that some portion would always remain as evidence, but it is proper for the analyst to remember that this bulk is more apparent than real, and that the substance of the fungus is made up in great part of water contained in a soft spongy tissue. An analysis of the *Agaricus muscarius* in the fresh state, one of the most poisonous of the fungi, gave the following results in 100 parts:—water 90·5; dry solids, including the poisonous principle, 9·4; saline matters ·1. The chemist, therefore, has very little solid matter to deal with; and unless the person dies quickly from the poison, no part of the original fungus may be found in the body.

In cases in which these noxious vegetables have destroyed life, inquiry is often anxiously made for some certain criteria by which the poisonous may be distinguished from the non-poisonous kind.

As a rule, poisonous fungi may be recognised by the pileus or cap having a peculiar conical or flattened shape, and being coloured yellow, brown, green, red, or orange-red; by the absence of a pink or purple-brown colour in the gills, and by a very disagreeable odour when the fungus is bruised. They generally grow under trees or in groves and woods, and are often seen attached to decayed vegetable matter. In the two cases related in this paper the fungi were gathered under trees. They were of a dingy lemon-yellow colour in the cap or pileus, and had an offensive odour when bruised.

The *Agaricus Campestris*, edible or wholesome mushroom, has a white silky pileus, from two to five inches broad, at first convex and afterwards plano-convex. When the pileus is cut through the fleshy part turns pink, and a pink juice may be squeezed from the young mushroom. The gills are at first of a pale pink, but afterwards become mottled and of a brownish-

purple colour. The flesh is firm, thick, and white, and it has no offensive odour when bruised. Although it may grow under trees, it is seen in an early stage in the form of snowy white balls commonly growing over meadows and pastures, partly concealed by the herbage. There is another fungus resembling it, namely, the *Agaricus Georgii*, or White caps, known from it, however, by its larger size and white gills. This is found in spring and autumn, growing in meadows, woods, and near buildings, haystacks, &c. The pileus is sometimes very large, from four to eighteen inches broad. When bruised or cut it turns yellow, and its smell is strong and unpleasant; its juice is yellow. It is said to be sold in London for edible purposes, but is generally rejected by house-keepers in the country. All white or colourless mushrooms are not necessarily wholesome, but, with few exceptions, those that are in any way coloured on the top of the pileus may be regarded as unwholesome. Fungi which are either colourless or coloured in the gills, if we except the pink and purple-brown colour into which the common mushroom passes, may be regarded as improper for food. When cooked, it is impossible to distinguish the poisonous from the non-poisonous varieties.

The ordinary mushroom, either from some peculiarity in its place of growth, in the mode of cooking it, from its indigestibility, or from idiosyncrasy in those who eat it, occasionally produces pain in the abdomen, with nausea, vomiting, and purging. This mushroom, as it is grown in Italy, is rejected in the Italian markets as unwholesome. The public look for some distinctive criterion, but all botanists agree that no criterion of noxiousness or innoxiousness exists in reference to these vegetables, for the same genus *Agaricus* contains some which are poisonous and others which may be eaten with impunity. The uncertainty and even danger attending the use of mushrooms as articles of food is illustrated by the following fact mentioned by Lindley in his 'Vegetable Kingdom' (p. 37). A family at Cambridge a few years since suffered from eating mushrooms; a part of what were gathered were submitted to Dr. Lindley, and it proved to be the *Agaricus personatus*, a species sold in the London markets, and considered by competent authority to be most excellent for

food. The numerous accidents which have occurred are, indeed, sufficient to cause a distrust of all fungi, excepting those which have been cultivated. So strongly did Professor Richard, the eminent botanist, feel the prudence of this precaution that, although no one was better acquainted with the distinctions of fungi, he would never eat any excepting such as had been raised in mushroom beds in gardens.

**CASES OF RHEUMATIC FEVER,
TREATED FOR THE MOST PART BY MINT WATER.**

COLLECTED FROM THE CLINICAL BOOKS OF

D R. G U L L,

WITH SOME REMARKS ON THE NATURAL HISTORY OF THAT DISEASE.

BY HENRY G. SUTTON, M.B. LOND.

IN studying the treatment of acute disease it is impossible not to observe how confidently remedies, various and even opposite in their modes of action, have been recommended; the experience of physicians of justly acknowledged great reputation, quoted; and results shown which in many cases appeared by no means unsatisfactory.

It is probably while endeavouring to explain the effects, so little to be expected from such different kinds of treatment, an opinion has been gradually formed that the natural course of the disease had more to do with the result than the remedy.

With little doubt, however, we shall all agree in acknowledging that any plan of treatment having for its object to show when, and how far it is necessary to have recourse to the aid of medicine in the treatment of rheumatic fever, is entitled to our utmost consideration. Therefore, cases treated, as the following cases have been, by such simple means that we might almost consider them to have been unassisted by any remedy, are invested with no little interest. And although the collective results may not warrant us condemning or praising any particular kind of treatment, yet they will probably

warrant us concluding that we ought not to be too hasty in considering the apparent sudden and favorable change in the symptoms due to any medicine administered.

We have more than once heard Dr. Gull remark, that these cases cannot be considered to have been treated solely on the expectant plan, for an occasional dose of Dover's powder, or half a grain of opium, night and morning, and two or three ounces of brandy a day, are remedies that might be fairly expected to exercise some, although, perhaps, little influence over the course of the disease.

One of the chief objects Dr. Gull had in view in instituting these investigations was to endeavour to gain a more accurate knowledge of the course the disease tends to take—that is, its natural history; and while, no doubt, we are enabled to compare cases in which little or no medicine has been given, with others in which it has been administered, and arrive at some conclusion, yet we cannot forget that rest in bed, a well-regulated diet, and good nursing, are powerful elements in the treatment of any acute disease, so powerful in fact that experience has shown not a few cases of continued fever and of pneumonia, and of other acute diseases, recover without further assistance.

Before proceeding to give records of these cases, we would beg to mention that no selection was made, but that Dr. Gull treated the cases which happened to be admitted into his wards on the same plan; and we would further beg to say that these reports were not kept for any special object, nor are they as complete as they might be; yet the facts stated, may be fully relied upon, and so far answer our purpose.

A Severe Case of Rheumatic Fever; Pericarditis; Endocarditis.

George E—, æt. 24, a groom, admitted June 5, 1863, into Stephen Ward; temperate habits; enjoyed good health until lately. June 2nd, had cold chills, and pains in his joints; did not at the time feel particularly ill, but gradually got worse and worse. On admission, said that this is his first attack. Pain with effusion into both knee-joints; pulse 104; respiration tranquil. A soft systolic murmur is heard. Area of cardiac dulness normal. A shooting pain in the epigastrium. Says that he is a little troubled with wind on the stomach. Tongue white, slightly dry, and brown towards the tip. Julep. Menthæ et Ext. Taraxaci ℥j, Æther. Chlor. ℥x, in singulis dosibus ter die. Milk diet. Brandy ℥j per diem.

June 6th.—A delicate to-and-fro exocardial murmur, heard chiefly on a level with,

also an inch below, the left nipple. Over the second left costal cartilage a slight murmur heard synchronous with the first sound; he makes no complaint, except of pain across the epigastrium. Breathing tranquil, 20 in the minute; pulse 96. On drawing a deep breath, feels a sharp pain between the fifth and sixth ribs over the apex of the heart.

8th.—Pulse 72. Has more pain in chest at night than during the day. Rept. mist.

9th.—Can move his legs up and down the bed. Tongue furred, red at the tip; to-and-fro sound heard over the heart; breathing tranquil; *joints free from pain*. Rept. mist.

12th.—To-and-fro sound much the same, but now heard all over the cardiac region. No increased dulness; *joints free from swelling and pain*; skin cool. Rept. mist. Diet the same.

16th.—Friction sound still remains, but heard very softly. Pulse 76. Rept. mist.

18th.—Feels better; in no pain.

19th.—Pericardial sounds cannot be heard; cardiac dulness normal, but there is a soft systolic bruit at the apex; pulse 100; joints free from pain; urine pale amber colour. Rept. mist. Milk diet and two eggs.

25th.—Got up to-day for the first time. Pulse 92.

28th.—Steadily improving.

July 3rd.—Under the nipple, and over the apex of the heart a systolic bruit is heard, and it is slightly musical.

6th.—Went out of the hospital.

Severe Case of Rheumatic Fever; Myocarditis.

John G—, æt. 30, admitted June 6th, a horse dealer. Has been in the habit of drinking a good deal of beer—fourteen or fifteen glasses a day. Seldom ever drank spirits, and said that he never felt drunk. His occupation compels him to walk a great deal, and while walking usually perspired very freely. Said that he had always enjoyed very good health previous to his present illness, that he had always enjoyed his meals, but never could eat fat meat. In the morning after drinking, occasionally suffered with what he called a “cough,” and not unfrequently he vomited. Physiognomical appearances.—Well-developed head; hair dark brown, inclined to be thin; complexion florid; features regular; *alæ nasi* moderately; upper lip somewhat thick; eyes dark brown; his teeth were sound, regular, and worn down at the edges; his skin was fair and thin; height five feet ten inches; weight thirteen stone; he is a muscular man, and says that he was very fat twelve months ago.

The supposed cause of his illness he believes to have been sleeping in a damp bed three weeks ago. Two or three days after doing so he began to have pain in the limbs, and, as he expressed it, “felt very bad.” Obligated to go to bed, and soon afterwards he came into the hospital. He further stated that eighteen months before this attack he had suffered now and then with pain in the shoulders and neck, but his joints were not swollen.

On admission he complained very much of severe pain in both his wrists and his knees. Skin hot, and perspiring very freely, with a strongly marked rheumatic

odour; tongue white, and thickly furred; pulse rather quick and feeble; area of cardiac dulness normal, sounds also, except that the first sound is somewhat feeble. Opii gr. j statim. Dec. Lini pro potu. Milk diet.

June 9th.—Much the same, in great pain, and the joints swollen. Skin hot, and perspiring profusely; bowels confined. Ol Ricini ʒss; Opii gr. j o. n.

11th.—Says the pain in the joints is no better; the ankles also affected. He appears low and depressed. Skin hot; cannot move in bed; heart's sounds without murmur, but the first sound is exceedingly feeble; respiration quick. Pil. Hydrarg. gr. v, hâc nocte; et pergat., P. Sodæ Potassio Tart. efferves., P. L. ex aq. tepid, cras primo mane si opus sit. Julep Menthæ et Taraxaci ter die. Brandy one ounce three times a day in barley water.

Dr. Gull here remarked, although there is here no bruit, and no markedly increased dulness, yet the peculiar, feeble, almost suppressed first sound, probably indicates that the muscle of his heart is mainly suffering.

14th.—Much the same. In great pain in his limbs, and also complains of pain and oppression in his left chest. Ordered Emp. Canth. to be applied to the chest. Pulv. Opii gr. iss in pil. o. n. Rept. mist.

22nd.—States that he feels better, not in so much pain; tongue clean, largely indented at the edges; pulse feeble; cardiac dulness normal; impulse feeble, but discernable. First sound at the apex is now prolonged almost into a murmur; doubling of the second sound; rhythm of the heart irregular. Rept. Pil. and mist. Two eggs; pale brandy.

25th.—Improving. Heart's action much the same; pain much easier.

28th.—Still improving. First sound still prolonged; rhythm of the heart regular; pain going away. Rept. mist. Middle diet.

July 1st.—Much better. In no pain. Decoct. Cinchone c. Soda ter die.

7th.—In pain all over his body. Skin hot and perspiring; first sound markedly prolonged at the apex, but could not be called a bruit. Complains of pain in the chest. Emp. Canth. pect.

9th.—Relieved by the blister; not in so much pain.

11th.—Still more free from pain. Rept. mist.

14th.—Free from pain; skin cool; tongue clean; appetite good.

16th.—Discharged cured. When he left the hospital, although there was no decided bruit, yet the first sound at the apex was unduly prolonged, and almost a murmur.

Case of Rheumatic Fever; Pericarditis; Albuminous Urine.

John S—, æt. 22, admitted October 29th, 1864; always been rather delicate. Three years ago had rheumatic fever, and laid up two months. Ten months ago had another attack, which lasted three weeks. Further said, that three weeks since he suffered very much with face-ache, and continued to do so for a week; at the end of that time he began to suffer with pains in the limbs, and soon compelled to take to his bed.

October 29th.—When admitted his skin was very moist, and his countenance anxious; pupils rather dilated; tongue furred; pulse 132; resp. 40. Over the heart a loud to-and-fro pericardial murmur heard. Has great pain in all his

limbs, but no swelling. Can move his limbs, but it causes him great pain. Has the rheumatic odour. Urine sp. gr. 1025.

30th.—Ordered Haust. Menthæ et Taraxaci ter die.

31st.—Countenance anxious; complains of great pain in the chest; has not slept for two nights; bowels confined; legs much better, but his arms are still very painful; skin perspiring, and has the rheumatic odour. Urine sp. gr. 1027, acid reaction, and highly albuminous. Pulse 120, resp. 50.

November 1st.—Was ordered a grain of opium last night, which caused sleep; pain in the chest better; pain in the left knee. Pulse 120, resp. 48. Urine sp. gr. 1026, albuminous.

2nd.—Pulse 118, resp. 40. Pericardial rub not so distinctly heard.

3rd.—Pulse 120, resp. 50. Countenance anxious; arms very painful.

4th.—Little better, can put his hand to his head; did not sleep last night at all. Pulse 112, resp. 48. Is not perspiring so much. Urine thick and amber colour; sp. gr. 1027, slightly albuminous.

5th.—Can move his hands and arms much better; pericardial rub scarcely perceptible. Pulse 120, resp. 54.

6th.—Has an eruption of sudamina over the abdomen; the contents of some of the vesicles are translucent and acid to test-paper, of others are opaque and alkaline. Pulse 120, resp. 48.

7th.—Pulse 112, resp. 44.

8th.—Can scarcely detect the contents of any of the sudamina to be alkaline, but they are disappearing. Pulse 115, resp. 42.

9th.—The eruption has entirely disappeared; seems much better, but his hands continue tender. Pulse 120, resp. 48.

10th.—Perspiration on the face gives an acid reaction, but only slightly so. Pulse 124, resp. 44.

11th.—Seems much better; he has a loud murmur at the apex. Pulse 120, resp. 40.

13th.—Much better; appetite returning; sleeps better at night. Pulse 82, resp. 16.

15th.—Does not sweat at all; in no pain. Pulse 90, resp. 22. Urine albuminous; sp. gr. 1024.

Went on improving up to the 25th, when he went out.

Rheumatic Fever, second attack; Systolic Bruit on admission.

William R—, æt. 24, carman, admitted November 23rd, 1864, into Stephen Ward. A strong healthy-looking man. Seven years ago had rheumatic fever, and laid up six or seven weeks with it. Ill ten days before admission. His joints are generally painful but not swollen, and other well-marked general symptoms. First sound of the heart attended with a slight systolic murmur. The area of cardiac dulness is oval-shaped, two inches in width, and about two and a half inches in length. Pulse 120; urine sp. gr. 1030; no sugar or albumen. Julep. Menthæ et Taraxaci ʒj ter die.

November 29th.—Pains in the limbs gone. Pulse 74; tongue clean.

30th.—All the rheumatic symptoms have disappeared.

December 2nd.—Dr. Gull saw him to-day, and said that the bruit is no longer heard, and that he is much better.

4th.—Convalescent. Potassio Ferri Tartrate gr. xv, Ex. Julep. Menthæ ter die. Middle diet.

10th.—Gone out cured.

Rheumatic Fever ; Pericarditis with Effusion.

Henry I—, æt. 26, married, a firewood-cutter, admitted October 15th, 1864, into Stephen Ward. A thin, pale, weakly-looking man. Had been ill fourteen days, not confined to his bed, but not able to work. Pain and swelling of the hand. Perspires a little at night.

October 15th.—Julep Menthæ c. tarax. 6tis horis; Extr. Opii gr. ss. nocte maneque si opus sit. Milk diet. Brandy ʒij per diem.

19th.—Pulse 84. Feels better. Wrists and fingers not so stiff and painful. Does not sweat so much; tongue white and furred; systolic bruit at the base of the heart; no friction sound; cardiac sounds distant; increased dulness over the cardiac region. Rept. Mist.

22nd.—In a good deal of pain, passed a very bad night. Rept. Mist.

25th.—Not much improved; still in great pain; area of pericardial dulness increased. Ol. Ricini ʒss statim.

26th.—In less pain; dulness over the heart much the same.

27th.—Increased pain in the right wrist. Rept. Mist.

28th.—In no pain; sweats less; area of cardiac dulness now natural.

November 3rd.—Not so well; pain in his left shoulder; perspiration returned again; has severe pain in his left shoulder. Pulse 120. Passed a bad night.

4th.—Much better to-day. Pulse 104. Haust. Quinæ ter die.

8th.—Much improved the last three or four days. Pulse 76; tongue clean free from pain. After this he gradually got well, and left the hospital.

28th.—Quite recovered.

Rheumatic Fever with Aortic Regurgitation.

Thomas F—, æt. 11, admitted March 2nd, 1864, into Clinical Ward, under the care of Dr. Gull. Says that he has had two previous attacks, the first when he was five years old, the next three months ago; since which time he has never been so strong as he was previous to the second attack. His present illness commenced ten days ago, when he got wet feet, and the same day felt pain in the joints, headache, thirst, and general feverishness. The joints did not swell much, but were extremely painful.

On admission complains very much of pain, especially in the knees and ankles, which are hot and a little swollen. His tongue is red and rather dry, and in parts covered with white fur. Pulse 100, full and sharp; skin dry and hot; complains of great pain; urine scanty and high coloured; bowels constipated. A double bruit heard over the region of the heart. Ordered—

℞ Hydr. c. Creta gr. ij, statim;

Ol. Ricini ʒi, post horas quatuor.

Milk diet with brandy ʒj per diem.

Ext. Taraxaci ʒj;

Ext. Julep. Menthæ ʒss, 6tis horis.

March 3rd.—Has had a restless night, complains of pain all over him, and of headache, and of being very thirsty; sweating freely; skin hot; pulse 100; bowels acted twice; knees less painful.

4th.—Swelling and pain in the knees have subsided, but now both wrists are affected, the left especially. Did not get much rest during last night. His skin is hot and dry; tongue is red; lips cracked; great thirst; no appetite. About noon he began to perspire very freely, and felt easier all the rest of the day. Pulse 120. Complains of pain over the cardiac region; heart's action is excited. The double murmur appears to be endocardial, and due to aortic regurgitation, the result of previous attacks of this disease. Rept. mist.; brandy ʒiiss per diem.

The pain only in left wrist, not severe; tongue clean and not red; skin dry but not hot; bowels acted freely this morning; urine passed more abundantly, contains a large quantity of urates. Heart's action much quieter; pulse 100.

6th.—*Free from pain.* Pulse 90. Slept well all last night. Appetite is returning.

8th.—Quite free from pain in the joints, but complains of headache. Pulse 90; skin cool; tongue clean and moist; bowels acted daily; urine clearer.

10th.—Felt slight pain in his wrists again yesterday and to-day, but they are not swollen, although hot and a little red; appetite better, and he sleeps well.

13th.—Going on well.

15th.—Allowed to get up for a few hours, as he is getting restless and tired of bed. Rept. mist.

17th.—Sitting up quite free from pain. His pulse is 100 in the erect posture; bowels open once a day; he feels pretty well.

19th.—Complains of pain and aching in his back towards evening, and of being rather thirsty; tongue clean; pulse 100.

20th.—Does not feel quite so well to-day; skin hot; pains in the back and loins; tongue rather red and dry; no appetite.

21st.—His skin is hot and dry; complains of headache; his wrists are swollen; pulse 140. Continue Taraxacum mixture; brandy ʒiij in 24 hours.

23rd.—A little easier. Pulse 120; heart not so irritable; he is still in pain; tongue much the same.

25th.—In less pain. Tongue not so red, but still furred; pulse 120. He does not sleep much. Bowels acted naturally; urine high coloured, deposits lithates in small amount.

28th. Better again. Pulse 100. Not in any pain; tongue cleaner; skin perspiring and cool.

30th.—Improving.

31st.—Went home relieved.

Rheumatic Fever; Prolonged first sound; Irregular Rhythm of the Heart.

George S—, æt. 19, a barman, admitted June 17th, 1863, into Stephen Ward. Has enjoyed good health, though a "strumous" looking subject. Four days ago, awoke in the morning, and found all his joints stiff and swollen, but not very painful.

19th.—Heart's sound free from murmur, but the first sound prolonged. The pulse jerking; knee-joints much swollen; also the left wrist; skin perspiring. Pulv. Doveri gr. v, o. n.; Julep Menthæ et Taraxaci ter die. Milk diet.

23rd.—First sound much clearer; no bruit heard. Rept. mist.

24th.—Rhythm of the heart irregular; no bruit heard; *joints free from pain*; skin cool. Rept. mist.

25th.—Rhythm still irregular; no bruit; tongue moist.

29th.—Much better; out of bed.

This case was only reported up to this point.

Charles A—, æt. 21, admitted May 3rd, 1863, into Stephen Ward. Ill three days before admission.

May 3rd.—Swelling of the left wrist; tongue furred; pulse 100; bowels constipated. Hyd. c. Creta gr. v, stat. Pulv. Seidlitz post hor. quat.; Julep. Menthæ et Ext. Taraxaci ter die. Milk diet. Brandy ʒiij per diem.

7th.—Tongue dry and brown. Rept. mist.

10th.—Much the same; still in pain. Rept. mist.

13th.—Pain came on in the right knee. Rept. mist.

14th.—Pain in both knees, not swollen. Rept. mist.

19th.—*Free from all pain*; no swelling of any of the joints.

23rd.—Much better. Decoct. Cinchonæ et Sodæ bis die. Full diet.

June 4th.—Discharged.

James G— (age not given), admitted November 11th, 1863, into Stephen Ward. Never had any illness; appetite generally good; had drank freely of spirits; severe pain in the joints, especially in the ankles.

November 13th.—Much the same. Julep Menthæ c. Ext. Taraxaci ʒj, 6tis horis. Brandy ʒij. Milk diet. Pulv. Doveri gr. x, hâc. noct.

15th.—Hands, knees, feet, and shoulders, hot, swollen, and painful; skin hot, but not sweating; pulse 92, full; percussion-sounds over the heart normal; first sound of the heart a little feeble, but without murmur; second sound clear. Dr. Gull thought the heart at present free from rheumatic inflammation. Rept. mist.

December 4th.—Remained much the same; very unwell; still taking the same mixture.

9th.—Improving. Decoct. Cinchonæ, ʒij bis die.

13th.—*When he was free from pain.*

Here the report ends.

Rheumatic Fever; eighth attack.

Napoleon L—, æt. 23, admitted November 28th. Has been in the hospital seven times with symptoms of rheumatic fever. Six weeks before admission had pain and stiffness in the joints; systolic bruit at the apex. On admission could not move the right leg, but two days afterwards it was nearly well. Perspiration; skin very hot; pulse 92.

December 5th.—Right shoulder and wrist affected, pain only slight; complains, on taking a deep breath, that he has pains across the chest.

12th.—Skin cool; slight pain in the shoulders; feels altogether better.

14th.—Out of bed to-day.

17th.—Had a pain in the loins, and still in pain in the shoulder. After this he gradually improved. Discharged on the 28th.

George G—, æt. 18, waiter, admitted July 18th, 1864. Drinks hard of beer; general health good; present illness began eight days ago; pain, swelling of the joints, and perspiration.

July 18th.—Ol. Ricini statim; Julep. Menthæ c. Ext. Taraxaci ter die.

20th.—A systolic bruit at the apex. Rept. mist.

August 2nd.—Gets up; *all the pain gone*. Ferri Pot. Tart. gr. v, Ext. Camph. ʒiiss ter die.

10th.—Pain in limbs gone.

18th.—Went out well.

Well-marked Case of Rheumatic Fever; Endocarditis.

Charles H—, æt. 33, horsekeeper, admitted July 31st, 1863, into Stephen Ward. Intemperate habits. Always enjoyed good health, except having had now and then a cold, until fourteen days ago, when he went to bed quite well, but in the morning was not able to put his right foot to the ground. The right ankle was painful and swollen; next day his left foot was attacked.

July 31st.—His ankle and shoulder-joints are much swollen; tongue moist; pulse 100, very full; skin hot, and sweating freely; first sound of the heart replaced by a soft blowing murmur; second sound clear; heart's visible impulse is seen unusually distinctly. Hyd. c. Creta gr. v, stat., et Ol. Ricini cochl. med. post horas quatuor; Ext. Taraxaci ʒj et Julep. Menthæ ʒj ter die. Milk diet.

August 3rd.—Feels much better; hands not so swollen; perspires freely. Rept. mist.

5th.—Feels better; tongue clean. Rept. mist. Milk diet.

7th.—Free from pain; skin cool; systolic bruit still remains. Rept. mist. Milk diet.

11th.—Free from all rheumatic symptoms, excepting the systolic bruit. Rept. mist.

14th.—Improving. Diet, fish.

17th.—Still continues to improve.

18th.—Ferri Pot. Tart., gr. v, et Julep. Menthæ ter die. Middle diet.

28th.—Discharged.

A well-marked Case of Rheumatic Fever.

John H—, æt. 20, admitted August 3rd, 1864, a ropemaker. Ill eight days before admission.

When admitted, pain, swelling of the joints, and sour perspiration; tongue furred. The first attack. Heart's action healthy.

August 5th.—Julep. Menthæ, Ext. Taraxaci ter die.

7th.—Feels better and stronger.

10th.—Free from pain, except in the right shoulder.

13th.—Convalescent.

22nd.—Discharged cured.

Rheumatic Fever, fourth attack ; Pleurisy.

John B—, æt. 16, admitted August 17th, 1864. Parents healthy. It is the fourth attack. Began two days ago, with pains in the knees and shoulders ; pulse 116, systolic bruit at the apex ; tongue moist, covered with white fur.

17th.—Pleuritic rub, with tubular breathing over the left side ; pericardium seems free ; pain in the joints. Julep. Menthæ c. Ext. Taraxaci ter die.

22nd.—Heart's impulse strong ; dulness increased ; intercostal spaces drawn in during the systole.

24th.—Pain in the left side, and pleuritic rub.

30th.—Systolic bruit over the apex.

September 12th.—Rapidly improved ; went out well.

Rheumatic Fever, well-marked ; Relapse.

John S—, æt. 21, admitted October 27th, 1864. Pain in the joints, swelling ; heart normal. Haust. Menthæ c. Taraxaci ter die ; brandy and water, hot.

November 7th.—Entirely free from pain ; appetite good ; urine normal.

12th.—Appears convalescent.

17th.—Been out in the park. The pain returned in his left shoulder.

20th.—Not so severe.

24th.—Again free from pain.

26th.—Left the hospital quite well.

FEMALES.

Rheumatic Fever ; Albuminous Urine.

Maria L—, æt. 34, admitted December 5th, 1864, into Mary Ward ; married ; one child ; always had good health ; ill a week before admission with supposed rheumatic fever. Suffering very great pain in the joints, the latter also swollen. Urine albuminous ; pulse 100 ; resp. 24.

December 6th.—In very great pain ; sweats a great deal ; no bruit ; urine the same ; pulse 102 ; resp. 26.

7th.—Passed a very restless night ; pain most severe ; heart's sounds normal.

8th.—In great pain, especially in the shoulder. Dr. Gull saw her, and ordered Julep. Menthæ ʒj, Ext. Taraxaci ʒj ter die.

9th.—Passed a better night, and feels much better ; skin cooler ; pulse 85 ; resp. 21. Dr. Gull said she was doing well. Hydrarg. c. Creta, gr. v, statim, Ext. Opii gr. j o. n. s. : Ol Ricini cochl. med.

10th.—Much better. Urine still albuminous ; pain much less.

12th.—Not so well. Pain much worse; skin hot; resp. 22 and difficult; complains of want of sleep.

15th.—Not so well. Urine still albuminous; great pain and sweating; pulse 90; resp. 22. Continued much the same until the 19th, when she appeared much better; less pain; pulse 88; resp. 22.

26th.—Not so well; pain in the knee returned.

January 9th.—Dr. Gull thinks she is going on well.

13th.—Pain in the knees.

20th.—Going on well.

24th.—Much better. No pain anywhere. To go out on 27th.

Rheumatic Fever; Double Pleurisy; Endocarditis.

Jane C—, æt. 29, admitted November 18th, 1863, into Mary Ward; char-woman; unmarried; always delicate; a pallid-looking woman, with dark eyes. Her mother suffered with rheumatic gout. This patient stated that five years ago she was in Westminster Hospital for rheumatic fever. Six weeks ago pain in her limbs, obliged to give up work. Four days ago ankles swollen; heart sounds feeble; first sound prolonged; pain in the joints and swelling; perspiration; physical signs of acute pleurisy over bases of both lungs.

November 21.—Ext. Opii gr. j, o. n.; Julep. Menthæ ʒj; Ext. Taraxaci ʒj ter die. In some pain in the joints; perspiring very much; feeble systolic bruit.

23rd.—Sweating profusely; very acid; dulness and egophony right base; friction over left base.

30th.—In less pain; friction sound distinctly heard over right base.

December 1st.—*Pain gone*; appetite returning.

6th.—Got up to-day.

8th.—Bruit still heard.

10th.—Improving. Ordered Decoct. Cinchonæ ʒj ter die.

13th.—Gets up daily. Went out cured.

Rheumatic Fever, third attack.

Elizabeth B—, æt. 25, admitted August 2nd, 1864, into Mary Ward; single; laundress; health usually pretty good. Has had rheumatic fever twice before. Been ill fourteen days before admission with sore throat and headache, believed to be a cold. On admission, joints of the legs only affected, but those of other parts had been affected. Feels very weak; tongue clean; no appetite.

August 2nd.—Haustus Menthæ c. Sodæ bis die.

8th.—*Free from pain*; out of bed.

11th.—Gone out well.

Rheumatic Fever, second attack; Heart complication.

Emma F—, æt. 15, admitted August 11th, 1864, into Mary Ward. Second attack of rheumatic fever; pain and swelling in the joints, especially at wrists; vertigo; pulse 112.

August 12th.—Julep. Menthæ et Taraxaci ter die; systolic bruit.

24th.—Getting better.

26th.—Improving; sleeps well.

29th.—Systolic bruit gone, and in other respects much better.

30th.—Ferri Cit. c. Quiniæ gr. iv.

31st.—Complains of feeling weak.

September 1st.—Improving.

12th.—Out of bed to-day.

Sept. 24th.—Went out well.

Rheumatic Fever ; Pericarditis.

Emily W—, æt. 25, admitted November 9th, into Mary Ward; married; a night nurse at Stephen Ward; pale looking, weakly woman; had been subject to fits, in which she used to bite her tongue. Skin hot; pain so great in her joints that she cannot move in bed; cheesy exudations on her tonsils. Pulse 120; resp. 48.

November 10th.—Pulse 90; resp. 48; Haust. Efferves. et Quiniæ gr. ij ter die.

11th.—Pericardial rub; great pain in the head, legs, and left arm.

14th.—Resp. 48; sweats much; Julep. Menthæ et Taraxaci ter die; Ext. Opii gr. j in pil. o. n. s.; Brandy ʒij.

15th.—Pulse 80; throat more sore; no appetite; still in pain.

17th.—Pain in the right shoulder and fingers of the right hand; no brandy to-day.

22nd.—Pulse 80; resp. 30; bowels open; skin cooler; very much better.

30th.—In no pain, but felt weak, but out of bed to-day.

Rheumatic Fever, symptoms well marked, second attack.

Mary Ann D—, æt. 20, milliner, admitted May 6th, into Mary Ward. She had a slight rheumatic attack when thirteen years old. Present attack commenced fourteen days ago with pains in her face and wrists, then in her ankles. On admission, pains in all her joints; sweats a great deal; perspiration intensely sour; skin hot; tongue furred, yellowish brown; pulse 116; resp. 50; no albumen; heart free from murmur. Ext. Taraxaci, et Julep. Menthæ 6tis horis. Milk diet; brandy ʒj.

May 9th.—Much the same. Rept. Haust.

12th.—Feels better; not so much pain. Rept. Haust.

15th.—Pulv. Doveri, x hâc nocte.

16th.—Joints still less painful.

18th.—Feels much better; can use her hands, bend her knees, and turn in bed without pain.

19th.—Ol. Ricini ʒss.

22nd.—Slight pain in her right side, and short of breath.

26th.—Going on well.

30th.—Gets up daily.

June 2nd.—Went out.

Rheumatic Fever, symptoms well marked.

Mary Ann S—, æt. 21, single, servant, admitted November 6th, 1861 into

Mary Ward, stout built, with sallow skin and dark eyes. Three weeks ago caught cold, her limbs became painful and swollen. On admission left knee and right hand swollen and tender; perspiring very freely; pulse 110 and feeble; resp. 26; slight systolic bruit; urine deposits lithates; no albumen. Ext. Taraxaci ʒj, Ext. Julep. Menthæ 6tis horis; Hydr. c. Creta gr. v, statim; Ol. Ricini pcst. h. s.

8th.—Right hand more painful; to be wrapped in cotton-wool.

9th.—Feels much depressed; right hand not so painful, left tender and swollen.

12th.—Knees most painful. Pulv. Opii gr. j o. n. Rept. Haust.

16th.—Pulse 86; pain the same.

18th.—Pain and swelling have left the knees, but the shoulder is still painful; sour perspiration; appetite improving; bowels confined. Pulv. Rhei Salinus ʒij, Ext. Julep. Menthæ statim. Rept. Haust. Taraxaci et Menthæ.

30th.—Left shoulder painful. Adde in singulis dosibus misturæ; Tinct. Calumbæ ʒj. To have an egg and rice pudding.

December 2nd.—Tongue cleaner; appetite good.

5th.—Shoulder less painful; doing well. Pil. Rhei co. gr. v, bis die si opus sit; Quiniæ Di sulphat. gr. ij, bis die 6tis.

8th.—Says she is free from pain. Discharged cured.

A Severe Case of Rheumatic Fever; Endocarditis.

Elizabeth H—, æt. 12, a servant girl, admitted February 5, 1864, into Clinical Ward, under the care of Dr. Gull. She had been much exposed to wet and cold. Cannot trace any hereditary tendency. Has had scarlet fever and measles. For three weeks before admission had suffered with headache and pain in her back, and gradual loss of appetite. On February 2nd, that is, three days before admission, she was seized with pain in her limbs, especially in her knees, ankles, and wrists, which were slightly swollen and painful.

February 5th.—On admission, in very great pain, so much so that she dreaded for anyone to touch the bedclothes, or even shake the bed; cheeks flushed; head very hot; perspiration very profuse, and has the peculiar acid smell; wrists and knees seem exceedingly tender to pressure; the superficial veins of the legs are very much distended, and also on the dorsal region of the feet; veins also of the arms enlarged; shoulders and joints, and also the right elbow, swollen. *Heart.*—First sound is prolonged slightly, and there is a slight murmur accompanying it, which is heard most distinctly over the base of the heart. Tongue white, furred, and red at the tip; pulse 102; resp. considerably accelerated; complains of an uneasy sensation in her chest; bowels regular; urine passed freely. Sp. gr. 1022. No albumen or sugar. Ordered—

R. Ext. Taraxaci ʒss, Ext. Julep. Menthæ ter die, 6tis horis;
Hydr. c. Creta gr. iij, statim. et Ol. Ricini, post hor. quat.

8th.—Says that she is worse; the pain in the joints are very intense, and they have been wrapped in cotton-wool; tongue very white, red at the edges. There is a loud murmur over the base of the heart accompanying the systole. Resp. 38. She has pain in the chest of a darting character. Rept. Mist.

10th.—States that she feels better. The pain in the joints not so severe, with the exception of the shoulder, which is worse. Tongue is cleaner; resp. 30; pulse 94; cannot hear a murmur this morning; perspiration in the axilla is alkaline; acid on the left side of the face. Rept. Mist.

12th.—Says she is better; does not sweat so much; joints not so painful; first sound of the heart prolonged, and a slight murmur with that sound; tongue cleaner; appetite pretty good; pulse 84; resp. 30. Rept. Mist.

17th.—Feels better; no pain in the joints; the swelling has disappeared; has no pain in any part of the body; the heart is clear, but the first sound is prolonged; pulse 80, and feeble; resp. 26; appetite good; bowels regular. Rept. Mist.

24th.—Left the hospital cured.

Well-marked Case of Rheumatic Fever, third attack.

Eliza B—, æt. 15, general servant, admitted into Clinical Ward, under Dr. Gull, March 12th. Says that when six years old she had rheumatism, and was ill about three weeks, when she recovered perfectly, and has enjoyed very good health until about last Christmas, when she had pains in her face and a sore throat, and also pains in her wrists, arms, and feet. Has not been exposed to wet or cold, and has worked up to two days ago, when she was compelled to go to bed, and the pain had gradually increased.

On admission, complains of pains in her knees, hands, and ankles, the knees and thumb of the left hand being swollen. The weight of the bed-clothes causes the pain to be intense. Pain worse at night than during the day; skin hot and moist, but does not sweat very much; the perspiration is decidedly acid to test-paper, and there is also the peculiar odour of rheumatism. The face is very much flushed; the tongue coated, white in the centre, and red at the tips and edges; pulse 100, and slightly intermittent; chest normally resonant; respiratory sound normal; first sound of the heart slightly prolonged. No appetite; bowels regular; urine passed freely, contains no albumen, and sp. gr. 1025. Julep. *Menthæ et Taraxaci ter die.*

14th.—The pain is much more severe to-day. The shoulders and the wrists are swollen, also the hands and knees, and exceedingly painful; sweating more freely; perspiration acid; pulse 120; resp. 32. *Heart.*—The first sound is still slightly prolonged, otherwise nothing particular observed. Rept. mist.

15th.—Pain still very bad. Slept pretty well last night; perspires more than previously; left arm wrapt in cotton-wool; perspiration on the face acid; tongue coated with white fur, red at the tip and edges: pulse 100; resp. 24. Heart in much the same condition. Rept. mist.

16th.—Says the pain is not so severe, and that she slept better last night. Joints not much swollen; tongue still coated; bowels confined; urine voided scantily; pulse 88; resp. 24. Heart in the same condition. Rept. mist.

17th.—Pain only in the right hand; perspirations have ceased; tongue a little cleaner; pulse 92; resp. 38. *Heart.*—First sound not so prolonged.

20th.—Pain very slight; tongue clean; appetite very good; pulse 88; resp. 26. Rept. mist.

21st.—Says that she is in no pain this morning. Tongue clean; swelling almost entirely disappeared; slept very well; pulse 84; resp. 24. *Heart* much the same. She continued from this time to do well.

We would here, moreover, beg to ask further attention to the case of J. G—, No. 2, for the character of the cardiac sounds was very interesting. It has already been more than once mentioned, that the first sound was exceedingly feeble, and, as Dr. Gull remarked, appeared as if it was muffled, or as if it was heard through a layer of cotton-wool. The rhythm of the heart was for a time irregular, and there was doubling of the second sound.

In his excellent work on 'Disease of the Heart,' Dr. Stokes has recorded two cases of rheumatic endocarditis, in which doubling of the second sound was heard. And in Case XIII, besides the change in the second sound, the heart's action was, as in J. G—'s case, irregular; its impulse feeble, and the first sound very weak, dull, and muffled. See Case XIV, also pages 117, 118, and 119.

In the case of a young man lately under the care of Dr. Gull, the peculiar character of the heart's sounds was well shown. The patient had, previous to his admission into Guy's Hospital, come under our notice while attending at the City of London Hospital for Diseases of the Chest, for our colleague, Dr. Southey, when he complained of pain in his legs, especially in the left knee. He was sweating very freely, his tongue was coated; and he looked ill. The first sound of the heart was so feeble that it was with difficulty heard at all, and this was the case both over the apex and base of the heart, yet there was no indicated area of cardiac dulness; the second sound was doubled in every six or seven beats of the heart; there was no visible impulse below the left nipple, but the impulse was very distinct in the epigastrium. Pulse was very feeble indeed; the respiration was accelerated. On admission into hospital, it was noticed that his power of moving his lower extremities was impaired, especially on the left side, which led to a doubt as to whether the whole change was not due to some change in the spinal cord. However that might be, it was a good illustration of doubling of the second and exceedingly feeble first sound, and probably the consequence of, as

Dr. Gull remarked, some important change in muscular tissue of the heart.

We have recorded the above examples of the disease, some as briefly as possible, others more in detail, with the object of showing the kind of cases in which this plan of treatment was adopted; they were all well marked, and in by far the majority the symptoms were acute. And while some of the cases might be regarded as favorable, others might justly be considered as unfavorable; such as would be likely to put severely to the test, the success of any system of treatment.

We will next proceed to ascertain what the facts observed in these cases tend to show. And the question that we propose to take first into consideration is the duration of the disease.

The experience in these cases was no exception to what is commonly seen; the number of days that the patient was ill varied very much, as the following observations will show:

George S—, ill three days before admission; admitted June 17th; knee-joints painful, much swollen, also left wrist. Treatment began on the 19th. On the 24th free from and remained free from pain—that is, *on sixth day of treatment*.

Charles A—, also ill three days before admission. Pain and swelling in the left wrist, subsequently in the right knee, afterwards in both hands. Treatment began May 3rd. On the 19th free from pain—that is, *on the sixteenth day*.

Charles H—, ill fourteen days before admission. Entered the hospital July 31st. Skin hot, sweating freely, shoulders much swelled; pulse 100. August 3rd, feels much better. 7th.—Free from pain; skin cool—that is, *on the eighth day*.

John H—, ill eight days before admission. August 3rd admitted. Pain and swelling of the joints; some perspiration. 5th.—The treatment began. 7th.—Feels better. 10th.—Almost entirely free from pain. 13th.—Completely free from pain; convalescent—that is, *on the tenth day of admission, and the ninth day from commencement of treatment*.

Ellen S—, admitted July 15th, convalescent July 20th—that is, *on the fifth day*.

Elizabeth B—, admitted August 2nd, ill fourteen days before admission ; joints of the legs swollen and painful. 8th.—Free from pain—that is, on the *seventh day*.

Sarah H—, ill seven days before admission, admitted December 10th. Pain and swelling in the knees and ankles. 15th.—In less pain. 16th.—Pain gone—that is, on the *seventh day*.

William L—, ill ten days before admission. November 25th taken in the hospital, and on the 29th, free from pain—that is, on the *fifth day*.

In the above description, it is to be understood, that when it is stated that the pain had abated, the skin was also cool, tongue clean or cleaning, and from that date the patient continued to do well.

These cases we have chosen with the object of showing that the symptoms of rheumatic fever may, unaided by treatment, entirely abate in five, six, seven, or eight days ; that the pain in the joints may be severe, swelling marked, skin hot, yet perspiring ; tongue furred, and no appetite. All these symptoms may subside and entirely disappear within a week. We have further observed more than once, a patient complaining of pain, accompanied with more or less swelling in one or two joints, with furred and dry tongue ; the skin hot, also some perspiration, and on the next morning all these symptoms had disappeared. The sudden and complete cessation of the acute symptoms was observed in these cases, apparently equally as well as is seen in patients who are taking large doses of medicine. The gradual but satisfactory improvement in the symptoms was well seen in a case lately under the care of Dr. Rees in Esther Ward. On the 7th August the skin was hot, yet perspiring very freely ; the tongue furred ; the knees and wrists were painful, but not much swollen. On the 9th August the skin was cool, tongue clean, pain almost entirely gone, and the patient expressed herself as feeling much better ; yet that patient had not had a dose of medicine except Aqua Menthæ ter die. Milk diet. Another case, also in Esther Ward, and under the care of Dr. Rees, showed well the steady improvement in the symptoms, as seen below. August

14th, on admission the patient complained of great pain in the hips and knees, and the latter joints were swollen; skin hot, with the rheumatic odour, and perspiring very much. Ordered Aqua Menthæ ter die. Milk diet. On the 16th she stated that she was not in so much pain, but the joints of the right hand were swollen and painful; the tongue thickly coated with yellow fur, and red at the sides; perspiring very freely, with the rheumatic odour strongly marked; pulse full and regular; little or no appetite. 18th.—Still in pain, otherwise much the same. 22nd.—Tongue still thickly coated; sweating freely; bowels had not been open for three days; joints still very painful, and especially the wrists; the urine high coloured, and a deposit of lithates; sp. gr. of the urine 1030. On the 23rd in no pain; appetite improving. 24th.—Remains still free from pain; tongue cleaning; appetite “getting better;” skin cool, and not perspiring; the saliva has become alkaline, and perspiration is either neutral, or faintly alkaline, certainly not acid. 27th.—Tongue much cleaner; appetite very much better; not in any pain, but perspiring freely; pulse 73; resp. 26; urine about the average quantity, acid reaction. September 1st.—Urine sp. gr. 1025, faintly acid; saliva alkaline; in no pain. 2nd.—States that she feels very well, free from pain; urine alkaline. This patient also had no medicine, excepting Aqua Menthæ ʒj ter die. Milk diet. We have not mentioned the condition of the heart in this case, and it is probably sufficient to say that a systolic bruit was heard over the apex of the heart, and also in the axilla; it was observed on the day of admission, and was probably due to a previous attack of rheumatic fever, of which the patient gave an account.

This was a typical instance of rheumatic fever; the symptoms were markedly acute. The progress of this case will probably be regarded as favorable, and such as would have done credit to any system of treatment. It was especially satisfactory to observe in this case, that although the bowels had not been moved for three days, the sp. gr. of the urine was as high as 1030, and the tongue thickly coated, nevertheless, two days afterwards, the bowels were relieved without the use of medicine, urine of lower specific gravity, the tongue and other symptoms gradually improving.

When we refer to those cases in which not only were the

symptoms acute, but there was undoubted evidence of pericarditis, or of endocarditis, we observe that the duration of the disease was increased, as may be seen by the following abstracts:—

The case marked No. 1, George E—, admitted June 5th, aged 24, was a good example of this disease, the symptoms were acute; there were pain and swelling of the joints, accompanied by other attendants of the fever, pericarditis and endocarditis. A to-and-fro murmur was distinctly heard over the region of the heart, but no evidence of any great effusion into the pericardium. The patient complained of pain over the region of the apex of the heart, which was especially felt during forced inspiration. Also a soft murmur was heard over the base of the heart. No especial treatment was adopted for either the arthritic symptoms or the inflammation of the pericardium. The friction sound continued to be heard during thirteen days, it then disappeared, and in its place a soft systolic bruit was heard over the apex, which remained even when the patient left the hospital. This patient was thirty-two days in the hospital, and at the end of that time went out apparently well, but with indications of a damaged mitral. The treatment began on the 6th of June. On the fourth day, that is, on the 9th of June, his joints were free from pain; on the seventh day of treatment, that is, the 12th of June, his skin was cool, and all the pain and swelling of the joints had gone. On the 25th of June, that is, the twentieth day of treatment, he was out of bed, and completely convalescent, and continued from that time to do well. In this case there was, on the day of admission, undoubted evidence of cardiac inflammation, therefore any endocardial mischief that was left could not fairly be attributed to the treatment.

The case marked No. 2, John S—, aged 22, was another good example of rheumatic fever with inflammation of the pericardium and with the addition of albuminous urine. It appeared to be his third attack; and during the first he stated he had been laid up two months. The last attack began, as is not uncommonly seen, by face-ache. On the day of admission the signs of pericarditis were well marked, also great pain in all his limbs, but no swelling. Pulse 132; respiration 40.

On the day after admission his countenance was anxious; he complained of great pain in the chest. Pulse 120; resp. 50. He was ordered Julep. Menthæ c. Tarax. ter die.

Having had a grain of opium on the night of the 31st of October, it was found on the morning of the fourth day after admission into the hospital, that he had slept well, and that there was less pain in the chest, but the knee was painful, and the mean specific gravity 1026, and albuminous. Pulse 120; respiration 48. On the seventh day of admission he could move his hand and arms much better; and the pericardial rub could scarcely be heard. Eighth day an eruption of sudamina was noticed. On the thirteenth day he seemed much better. On the eighteenth the rheumatic symptoms seemed to have disappeared. The pulse had fallen from 132 to 90, and the respiration from 50 to 22 a minute. He continued daily to improve, and went out of the hospital on the 25th of November—that is, on the twenty-eighth day after admission.

We would next refer to the case of Elizabeth H—, aged 12, who was admitted into the clinical ward 5th February, 1864, under the care of Dr. Gull. It is stated that she had been ailing three weeks, but had only suffered pain in the joints for three days before admission. February 5th, the symptoms were acute; the pain was so great that it is stated she dreaded the bedclothes to be moved. Her cheeks were flushed, and her skin hot, but perspiring profusely, with the well-known rheumatic odour; the joints were swollen; a prolonged first sound heard over the base of the heart; her pulse was 102; urine sp. gr. 1022. No albumen or sugar. She was ordered the Julep. Menthæ ℥j ter die, and Hydr. c. Creta gr. iiss stat., Ol. Ricini post hor. quat. On the third day of her residence in the hospital the pain got much worse. A prolonged first sound was heard over the base of the heart; resp. 38. On the fifth day she felt much better. Resp. 30; pulse 94. The perspiration was neutral, or perhaps slightly alkaline. On the seventh day she stated that she felt better; she did not sweat so much. Pain was not so severe; tongue cleaning; her appetite was pretty good. Heart, first sound prolonged; the pulse had fallen from 102 to 84. On the *twelfth day* she was free from pain and swelling. Pulse 80; resp. 26. Appetite

good; first sound of the heart still prolonged. She continued after this to do well, and left the hospital February 24th, apparently cured. In this girl the rheumatic symptoms were markedly acute, the pain was very great, and yet the pain was better on the seventh day, and the appetite pretty good. On the thirteenth day free from pain. Pulse 80; resp. 26; appetite good; continued to do well, and she left the hospital on the twentieth day.

To recall the results seen in these cases: one patient was totally free from pain on the fifth day after admission; another on the thirteenth day after admission; a third on the thirteenth day also. In the first case the duration in the hospital was thirty-two days, in the second twenty-eight days, in the third twenty days.

A fourth case of this disease, in which there was evidence of cardiac disease, is given below.

Thomas F—, admitted March 2nd, physical signs of aortic regurgitation, the injury to the valves believed to be due to a previous attack of rheumatic fever. On the fourth day of admission he was free from pain. On the eighth day the pain returned, although slightly. On the eleventh day better again. On the thirteenth day out of bed. On the nineteenth day again in pain, wrists swollen. Pulse 140. On the twenty-third day in less pain. *On the twenty-sixth day again better. On the twenty-ninth day* went out of the hospital better, although evidently not quite well.

The next is a very instructive case.

Jane C—, admitted November 18th, had evidence of pleuritic effusion on the right, of acute pleurisy without effusion on the left side; and feeble systolic bruit heard over the heart. Yet on December 3rd, that is the sixteenth day of admission, she was free from pain. On December 6th, that is on the nineteenth day of admission, she was out of bed; and on December 13th, *on the twenty-fifth day* of her admission, she had quite recovered, and went out of the hospital.

Emily W—, admitted November 9th. On the 11th of November a pericardial rub was detected. On the 30th so much improved that she was allowed to get up—that is, on the twenty-second day of admission.

One more reference we venture to make, and that to the case of John G—, admitted June 6th, marked No. 2 ; it was a very instructive and severe one. The heart was apparently involved when admitted. At no period of his illness were there any physical signs of pericarditis, but the first sound of the heart was exceedingly feeble, as if it was muffled, and that, taken with the subsequent irregular rhythm and doubling of the second sound, led Dr. Gull to consider that the muscular tissue of the heart was much more involved than the sero-fibrous tissue. The external symptoms were acute. The joints were very painful and swollen, and there was profuse sour perspiration. He appeared very ill, and expressed himself as feeling so. On June 25th, that is, on the twentieth day, the heart's action was still irregular, but the pains had entirely gone. On July 1st, that is, on the twenty-fifth day, he was entirely free from pain, and in other respects much better—so much so that Dr. Gull ordered him decoction of cinchona, with sesquicarbonate of soda three times a day. On July 7th, that is, the thirty-first day, he was again in great pain all over his body. Skin again hot and perspiring, and he complained of so much pain in his left chest that Dr. Gull ordered a blister to be applied over the region of the heart, which he stated gave him great relief. On July 14th, the thirty-eighth day, he was a second time free from pain, and continued afterwards to do well.

Thus, on referring back, it may be seen that the average duration of the acute symptoms in the first seven cases, in which there was no evidence of the heart being involved, the abstracts of which have been just given, was 8·5 days, while in the last six cases, in which the heart was evidently affected, the average duration was 23·6 days. The recorded experience of other hospital physicians confirms what is here shown—that cases in which there is not, on admission into the hospital, evidence of much heart affection, tend to get well in from six to fourteen days, that is, within twenty days ; cases, however, in which there are very early indications of severe heart affection, tend to last over twenty days.

In the cases with little or no cardiac disease, the shortest duration of the acute symptoms was six days, the longest sixteen days. Where the cardiac disease was great, the shortest

duration of acute symptoms was seven days, the longest thirty-eight days. The cases marked No. 1, 5, 12 in the males, and No. 6 and 9, 7 and 17 in the females, tend to confirm the experience as late years have shown, that acute rheumatic pericarditis does not, as regards the recovery of the patient and the successful termination of the disease within a reasonable time, require any special treatment; and more than that, it shows a patient may have rheumatic inflammation of both pleuræ, and effusion into the right; the heart also may be involved; yet, in thirteen days, all the acute changes may subside, and the patient be convalescent and out of bed on the twenty-fourth day, and the only treatment adopted be a grain of extract of opium every night, and mint julep with extract of dandelion three times a day.

Such facts also tend to teach that acute rheumatic pericarditis may subside, without any treatment, except rest in bed, and careful diet, in fourteen days; that rheumatic pericarditis, complicated with albuminous urine, may, without medicine, except mint julep and a grain of opium, for one night only, have so far recovered as scarcely to be detected on the seventh day of treatment—and the patient afterwards continue steadily to improve and able to go out of the hospital within a month.

For some further observations on this point, see Dr. G. Gairdner's instructive 'Essay on Pericarditis.'

We next propose to inquire if there is any evidence to show that this kind of treatment rendered the heart more than ordinarily liable to rheumatic inflammation.

We would here beg to remark that it is Dr. Gull's impression that the cases, so treated, were not more liable to suffer with heart complication. Yet the difficulty at arriving at any very exact conclusion was, as it must always be, as long as the investigation is confined to hospital patients, very great. The chief obstacle is found in the fact, that so very few patients come into the hospital who have not already some signs of cardiac affection, or who have not previously suffered with rheumatic fever, and although there might be no bruit to indicate that the previous attack had injured the heart; yet it will probably be allowed that the absence of murmur is no proof that the endocardium or pericardium has not been damaged, and thereby rendering the heart particularly

liable to be attacked by any subsequent rheumatic inflammation.

The condition of the heart in these cases was as follows :

Evidence of pericarditis	in 6
A bruit mostly heard at the apex.	17
Rhythm of the heart irregular, but no bruit	2
First sound prolonged, but no actual bruit	2
Suspected myocarditis	1
Not stated	2
No abnormal sounds	11
	<hr/>
Total	41
	<hr/>

In nearly all, if not in all the above cases, the signs of cardiac disease were detected either on the day of or within two or three days after admission. This, however, depended upon how long after admission Dr. Gull saw the patient, for as Wednesday is the taking-in day at the hospital, and the Friday afterwards Dr. Gull's next day of attendance, two days would elapse. That is the reason why in some cases the heart is not mentioned until the second or third day after admission.

And we would here observe that it is very difficult, in some cases, as will probably be allowed, to say whether the heart has or has not been seriously injured.

When the symptoms are very acute, and the changes in the pericardium or endocardium acute also, the physical signs are usually well marked ; but when the symptoms are subacute and somewhat chronic, the changes are slower and more difficult to detect. It is generally easy to detect the friction sound in acute pleurisy, next to impossible to diagnose, by physical signs, those slow changes which give rise to greatly thickened pleuræ.

There is evidence tending to show that, although the rheumatic inflammation may have seriously injured the mitral orifice, yet a certain time must elapse before that is evident by physical signs.

Further, that the muscular tissues of the heart may have undergone degenerative changes, the consequence of the rheumatic inflammation, and subsequent post-mortem examination show the pericardium to be healthy, the left ventricle dilated and attenuated ; and in such cases there may or may not be a bruit.

It will be probably considered that, where the muscular tissue has been damaged, some time must elapse before we have all the signs of dilatation of the left ventricle, of the mitral orifice, and subsequent changes.

A very good example of this condition may be seen in the post-mortem records of Guy's Hospital for the year 1860; No. of record 180.

Samuel B—, aged 29, a patient of Dr. Habershon's. Had had a severe attack of rheumatic fever two years before. For six weeks before admission into the hospital he had suffered with severe pain "in his heart," pain in his stomach, and with shortness of breath. On admission, a loud systolic bruit was detected beneath the left nipple, and faintly heard in the axilla; the abdomen was tender; the liver enlarged; œdema of the feet and legs; no albumen in the urine. Autopsy, by Dr. Wilks, showed the condition known as "heart lungs," with some lobular pneumonia. Heart enlarged in all its cavities; left ventricle dilated; mitral orifice very large, no doubt admitting regurgitation, but the valve itself healthy; pericardium "healthy;" kidneys healthy; nutmeg liver.

There is a patient now under us at the Victoria Park Hospital, who complains of shortness of breath on exertion, and "weakness." The apex of the heart is three inches below and directly under the nipple; no visible impulse. The first sound extremely feeble; a sharp clicking second sound, but no bruit. He stated that two years ago he was laid up twelve weeks with rheumatic fever. There are no physical signs of emphysema or of any organic change to push down the apex of the heart.

Some years ago a boy about twelve years old was under the care of Dr. Gull for, and died of, rheumatic fever, in the hospital.

The post-mortem examination showed the heart had undergone extreme fatty change; the valves and pericardium healthy.

It would appear that in order to know whether the heart has been injured during the rheumatic fever or not, the patient should be examined six weeks or two months after the rheumatic attack.

Some very interesting facts were seen, in relation with

albuminous urine and rheumatic fever, which we must defer until the next number of the 'Reports,' when we hope to bring forward still further evidence, and records of more cases treated on the same plan; more especially as Dr. Rees proposes to treat a given number of cases with mint water, and an equal number with alkalies, lemon-juice, &c.

On referring to the table of these cases it will be seen that there did not appear to be any great disposition to relapse; it occurred in cases No. 5, 7, 11, in the males; and No. 12 in the females; in one case, however, as will be seen, it was brought about by going into the garden of the hospital too soon.

On looking back and taking into consideration what has been already stated, it would appear that cases of rheumatic fever in which the symptoms are acute, and in which there is no, or very slight, cardiac affection, tend to get well in seven to fourteen days; or, probably, we may safely say, under twenty days. That the majority get well under a fortnight, but it would appear that in order that such may be the case it is necessary that the symptoms should be prominent and acute, and that the patient should be of a tolerably good constitution, and that his tissues should not have been damaged by previous disease. When, however, we refer back to those cases in which the symptoms were sub-acute, or in which the patient's constitution had been weakened, we cannot but see that there was a marked difference, and the duration of the disease was much longer. In order, however, more clearly to demonstrate this, we would ask attention to the following abstracts:

Henry J—, aged 26, described as a pale, weakly-looking man, who had been ill fourteen days. When admitted complained of pain in his hands. He perspired freely during the night. Besides the mint julep he was ordered half a grain of opium every night and morning, with two ounces of brandy a day. On the fifth he felt better; pulse 80; but a systolic bruit was heard over the base of the heart, and increased dulness on percussion over the cardiac region. On the seventh day he was in a good deal of pain, and passed a very bad night. The treatment was continued, but in addition he was ordered to have half an ounce of castor oil. The signs of pericardial effusion remained, but no friction murmur was

heard. On the thirteenth day he was free from pain, but on the nineteenth day apparently worse than ever. Pulse 120; pain and perspiration had returned. On the twentieth day he was ordered *Haust. Quinæ ter die*. The next three or four days he improved much, and his pulse fell to 76. After that he gradually got well, and left the hospital November 26th, having been admitted October 15th—that is, forty-three days in the hospital.

Another case of a similar kind as the last, was that of Elizabeth D—, aged 18, in Esther Ward, under the care of Dr. Rees. She was a girl with regular features, face very pale, and stated she had always been delicate.

August 3rd.—On admission into the hospital she complained of pain in her left wrist, but it was not much swollen; also of pains in her knees. Her skin was not hot, but she remarked, when asleep “I sweat a good deal.” Her tongue was clean, but rather red; pulse was not quick, nor the respiration either. Percussion over the cardiac region showed resonance somewhat diminished, but no actual dulness, as high as the second rib. The heart’s visible impulse was diffused and very distinctly seen. Over the third left costal cartilage and third left interspace, also between the second and third rib, a murmur was heard, such as is usually likened to the unfolding of parchment. Besides this a more superficial crackling sound, as if the pleura over the pericardium was involved; the latter was more distinctly heard during inspiration. A well-marked systolic bruit was heard on listening over the carotids. She complained of soreness and tenderness across the chest. August 5th, that was the second day in the hospital, the physical signs were the same—no perspiration, no particular heat of skin—the rheumatic odour faintly marked; wrists painful. On the fourth day in the hospital, that was August 7th, the skin was hot, perspiring very freely; tongue furred; pain in the knees and wrists, but no swelling, and no pericardial murmur could be detected; but the first sound of the heart over the base was much prolonged. On the sixth day of admission, the skin was again cool, and the pain entirely gone, except a little in the ankle; and she stated that she felt much better. The first sound at the base still prolonged. August 11th, that is, on the eighth of

admission, the shoulders were very painful and stiff, but the tongue was clean, and she was perspiring freely; pulse not particularly quick, but full and bounding; face pale. August 12th, that was the ninth day, pain in her left wrist; skin neither hot nor perspiring; tongue slightly furred at the base; enjoyed her dinner. There was diminished resonance over the cardiac region, but no actual dulness as high up as the third rib. First sound at the base prolonged; visible impulse diffused and very distinctly seen. On the tenth day her breathing was quick, and she said that she could not lie on her left side, as immediately she did so it gave her pain right through her chest, pointing to the left side. No cough; the right wrist painful, the pain had left the ankle; she did not perspire much, and her skin had not any very distinct rheumatic odour. Heart's sounds the same. On the 16th August, the thirteenth day, ankles again painful, not swollen; tongue clean and moist; pulse rather quick and feeble. She remained much the same until 18th August, that was the fifteenth day after admission, when again she was free from pain; appetite good; skin cool; tongue clean. The first sound at the base less prolonged. She got out of bed without leave, and remained up three hours, and next morning the pain had returned into the ankles. She perspired when asleep, but she did not lose her appetite. August 22nd, the twenty-first day in the hospital, her pulse was 80, feeble; tongue clean; resp. 28; no perspirations, except when asleep; no rheumatic odour; free from pain, except an occasional shooting pain in the right hand; appetite good; sleeps well, and says that she feels a great deal better. The first sound of the heart is prolonged the same as it was ten days ago. The urine of sp. gr. 1012, pale looking, highly acid, and when boiled, with the addition of nitric acid, showed a trace of albumen. August 25th, the twenty-second day, the symptoms were much the same; she thought herself well, and asked to be allowed to get up. Saliva alkaline, perspiration also; heart sound at the base still prolonged. 26th.—Urine alkaline. 27th.—All the symptoms had subsided. September 1st, the thirtieth day, she was out of bed, but complained of pain in the ankles. Saliva acid; tongue moist and clean; skin smells rather sour again. 2nd.—Urine alkaline; saliva again alkaline also; pain in the

right knee; heart much the same. Up to this date she had taken no medicine of any kind, excepting mint water; no stimulants; milk diet the first fortnight, and then middle diet; but as she had lingered on, one day better and next day worse, she was ordered three ounces of brandy a day; mint water three times a day, and middle diet, and to be up every day.

She, however, did not improve much; the pain varied, and more than once she was compelled to remain in bed a day or two to get rid of the pain in the joints, mostly the ankles, and the joints of the fingers. All this time the tongue was quite clean, and the appetite was very good; the saliva alkaline; urine varied, at one time acid, at another alkaline. The prolonged first sound became more and more marked, and at present, for she is still in the hospital, it would be considered to be a decided murmur; and although she is now free from pain, and has been the last three or four days, yet for forty-four days she was more or less in pain, with other evidence of the rheumatic state, and indications of cardiac disease.

The average duration of the last two cases was respectively forty to forty-four days.

The latter class of case will be, we have no doubt, at once recognised as a not uncommon variety of rheumatic fever, and we have introduced it here on purpose, to contrast it with the preceding cases, and to show how far the plan of treatment that is applicable to one is also applicable to the other, and, above all, to point out how far each, unaided, tends to get well.

It would appear, from the above evidence, that those cases in which the symptoms are acute tend to get well much sooner than those in which the symptoms are sub-acute, and this agrees with what has been stated by Chomel in his 'Inaugural Dissertation:—“ Dans le rhumatisme aigu elle s'étend rarement au delà du deuxième ou troisième septenaire, quand il est intense, et du sixième quand il est léger.” (See Bouillaud, 'Rhumatisme Articulaire,' p. 292.)

Here we would mention that we have heard Dr. Gull several times observe that to have prominent and easily detectable symptoms is a good sign, for when the system is very low, an organ may be very much diseased without being able to tell us so. With respect to the rheumatic fever the hot skin, the

copious acid perspiration, the high coloured, and the high specific gravity and acidity of the urine, the sensibility to, and the acknowledgment of pain, are good signs, for in some of the very worst cases of acute rheumatism, the perspiration is alkaline; the arthritis slightly marked; the skin does not perspire freely, nor is there much or any pain.

The experience gained in these cases would appear to confirm Dr. Gull's remark.

It may also be noticed that in those cases in which the symptoms were acute, the patients had for the most part enjoyed good health previous to the rheumatic fever, and when we further call to mind that general experience has long taught, that acute sthenic symptoms occur for the most part in the healthy and robust, asthenic symptoms in the weak and delicate, we are led to consider that the acute cases recover well, not because they are severe, but because their severity indicates that the system has sufficient power not only to tell us of its sufferings, but further that it is capable of making a great effort to restore its tissues to a more healthy state of nutrition, and to remove the unhealthy matter by active elimination.

Here we would observe that the clinical experience of other physicians has shown that those cases tend to do the best in which the skin is rather hot, yet perspiring with the rheumatic odour, and the pain distinctly marked—(see Dr. Fuller's well known work on '*Acute Rheumatism*')—thus agreeing with what Dr. Gull's cases tend to teach.

Before, however, we conclude that acute sthenic symptoms are good indications, we would wish to inquire how far such a conclusion can be supported by what is seen in other acute diseases.

At the time that diseases were regarded as entities, when acute inflammation was looked upon as a sudden and rapid organic change excited by accidental circumstances in some part of a healthy body, it would have been impossible not to agree with the acknowledged opinion that severe and well-marked symptoms were not only a measure of the intensity of the inflammation but that they were also indicative of the danger to which the patient was exposed. The careful study, however, of morbid anatomy has shown that acute inflammation is not simply

active and rapid cell-formation in healthy tissue but rather acute change supervening upon chronic mal-nutrition or degeneration of tissue—(see Dr. Wilks's remarks in the 'Guy's Hospital Reports,' Third Series, Vol. IV).

And further, in confirmation of this observation, clinical experience has taught that the more the tissues have degenerated, the less evidence they appear capable of giving to our senses that they are inflamed; that earlier the age, more vigorous the constitution, and more marked the symptoms of inflammation, while older the life and more broken down the constitution, the less openly do acute changes in the tissues betray themselves.

The history of acute pneumonia illustrates this statement. A man who has lived regularly, and who is of a tolerably good constitution, is suddenly attacked, in the midst of apparent health, with inflammation of the lungs. His skin becomes burning hot, his breathing rapid, his expectoration rusty. The physical signs are very well marked, and show that the lower half of one lung is consolidated. Such a man, experience has shown, generally does well, for not only does the disease run gradually to resolution, but, more than that, after resolution has taken place, the new matter is apparently completely removed, and no secondary change follows; no new chronic cell-formation has been brought into existence. Whereas, if inflammation attacks an old man, or one who has drunk hard—whose tissues have degenerated, the patient complains much less, the symptoms are less evident, the physical signs are less distinctly marked. The acute change may apparently subside, but from that day the patient is noticed never to be well. After a few months or a year or two he dies, and the autopsy shows that a new cell-formation, akin to a growth, has steadily gone on apparently ever since, and in the same seat as the previous inflammation.

Similar experience is seen in cases of acute pleurisy, when we contrast the symptoms seen in a vigorous young man, coming on after rowing hard, or some other such determining cause, with those seen in a man who is suffering with granular degeneration of the kidneys, emphysematous lungs, and other degenerative changes.

If, however, we compare the natural history of acute rheumatism with that of gout, we see a still closer analogy. Observa-

tion has long taught, beyond all question of doubt, that if a man be highly gouty and has an attack of gouty inflammation of the toe, it is followed by great relief to the system. The agony is great, and the inflammation appears great, yet after a time it subsides and the patient expresses himself better than before the attack. It is supposed that the severity of the attack corresponds with the amount of gouty poison in the blood, and the inflammation is a "depurating process." Certain it is, that when the tissues of gouty men have degenerated, the attacks of gout are no longer marked with the same severity. Symptoms feebly marked appear more frequently, and are looked upon as evidence of "mild attacks;" the intervals between the attacks are shortened, and the patient is no longer sensible of much relief. To finish the comparison, it is further well known that a patient, subject to gout, may be very low, depressed, feeling and appearing weak, occasionally seen to be getting somewhat quickly anæmic; his urine is examined, and found not to contain any albumen, but neutral, or occasionally found to be alkaline. The same patient has an attack of gout—the urine becomes acid, high coloured, of high specific gravity, loaded with lithates, and he gets marked relief.

If, therefore, what has been last stated be correct, we are led to regard acute sthenic symptoms as indicative of a highly disordered state of the system, but also evidence of a certain amount of power in the system.

Other illustrations might be brought forward, but we may probably appeal to general experience to show that the very acute diseases that physicians formerly regarded as sthenic, and requiring active treatment, are now found to be those that tend to get well without the aid of medicine.

Let us now refer back to the case of Elizabeth D—, under the care of Dr. Rees, where, as we stated, there was no perspiration, except when asleep, and, during a greater part of the attack, the skin was cool, the tongue was moist and clean, and very slight pain, but there was evidence of pericardial and probably of endocardial disease, and the latter was becoming more and more unmistakeable every day. The urine was generally of pale colour, and of low specific gravity. One day the perspiration was neutral or alkaline, and little or no pain; another day the skin rather hot, perspiring rather freely; the perspiration had an acid re-

action, the saliva also ; and the pain and tenderness in joints acute. In fact, when the pain was acute, and the skin hot, the perspiration was acid ; when the skin was cool, and little or no pain, the perspiration was neutral, or alkaline. So the case continued for over six weeks. The frequently repeated relapses showed clearly that the rheumatic condition remained ; and although the external rheumatic symptoms were altered, the cardiac mischief apparently progressed. In fact, the symptoms disappeared, but the disease did not. The patient was a weak, delicate-looking, girl, and her system did not appear to have sufficient power to cast off the unhealthy matter. Every now and then it seemed to make an effort, but had not the strength to continue. The disease tended to become chronic, and, as a consequence, to become insidious.

This case would appear to show that we may have a rheumatic condition of the system without any rheumatic symptoms. That a person may have the rheumatic fever without the rheumatism, the fever without the arthritis, we are all well aware some of the most distinguished minds of our profession have believed and affirmed.

We are every now and then coming across cases in which we learn that a patient does not feel well, thinks she loses flesh, and her friends notice that she is getting pale, she complains of occasional slight pain, and is apt to perspire freely ; no physical signs to indicate chest, and no evidence of other organic disease. A week afterwards we learn that while going from the hospital she caught cold, and the day afterwards the pain fixed itself in a joint ; in a few days more there is undoubted evidence of rheumatic fever. She recovers, and is apparently better than before her illness.

A young girl was in the Clinical Ward last year, under the care of Dr. Gull, for paralysis of the face. She had slight wandering pains, and occasional perspiration, which gave an acid reaction to test-paper. She remained about the ward for three weeks, and at the end of that time it was quite clear that she was suffering with rheumatic fever and rheumatic endocarditis.

A patient now under us as an out-patient, at the City of London Hospital for Diseases of the Chest, complains of shortness of breath, cough, and of other symptoms. A systolic murmur can be heard over the apex of the heart. On inquiry,

she stated that she had never to her knowledge had either scarlet or rheumatic fever ; but on further inquiry, she stated that about two years ago she attended the London Hospital as an out-patient, when she felt very weak, and that she then complained of pains flying about her. She however got better, but the last few weeks the pains had been gradually getting " bad " again.

A young lady was suffering from sore throat ; she was very subject to enlarged tonsils. Some yellow cheesy-looking substance was noticed on the tonsils. She appeared depressed, and was sweating very freely, but no acid odour. She was kept in bed for three days, then appearing much better, she was allowed to get up. She seemed to improve, but her friends remarked that they could not tell why she did not gain her strength as fast as she had done after her previous attacks of sore throat. One day, about a month after she had had this throat affection, she complained of pain in the right knee. Her skin was cool, but when asleep she perspired, but not very much ; no rheumatic odour ; tongue clean ; her pulse not particularly quick. For precaution sake she was kept in bed, and ordered half-drachm doses of bicarbonate of potash with lemon juice, three times a day, and milk diet. There was pain, first in one knee, then in the other, also in the ankles, but no swelling ; so she continued for eight or ten days. She complained very bitterly because she was kept in bed, for, as she expressed it, " I don't feel ill." About the end of that time the pain became more severe ; the knees and wrists swelled, and the skin became hot, but still not much perspiration ; tongue rather furred. A harsh, grating, to-and-fro murmur was heard over the heart. This case got gradually worse and worse, the dyspnœa became so great, or rather the breathing became so accelerated, that it was most distressing to see her. She recovered in about seven weeks, but to this day a loud systolic murmur is heard over the apex and over the angle of the left scapula.

We may probably appeal to observation to show that it is not very uncommon to see a young person, who appears as if she is threatened with phthisis, seized with rheumatic fever, and after completely recovering from the fever appears to be in much better health than before the attack. When speaking

of experience like this, Dr. Gull remarked,—rheumatic fever sometimes appears as if it saved a person from phthisis ; and it has certainly seemed so to us.

Is there not evidence in all this, to lead us to think that there is a rheumatic condition of the system, that we may not be able at present to recognise by symptoms, and yet a slight exposure to cold, or any such determining cause, may be the means of exciting acute changes upon chronic rheumatic condition. It is in the many different ways the same morbid state may manifest itself, that we find the difficulty in collecting statistical evidence about any given disease. We have a group of symptoms which indicate certain morbid conditions, and we assign a name ; but when the diseased condition is there, and not the symptoms, or not the same symptoms, we are at a loss.

In relation with the rheumatic state, is the very important question, when we have lost all the symptoms of rheumatic fever,—has the patient lost the rheumatic condition of the system. The case of Dr. Rees would lead us to think not. Moreover, we would further call to mind, that although all the acute symptoms may have ceased, yet the evidence of endocardial change may go on day by day increasing, till at the end of six or eight weeks, that which was a prolonged first sound at the apex, is after six weeks an undoubted bruit. There was this summer, in the clinical ward under Dr. Wilks, a case of rheumatic fever, with severe acute symptoms. Blisters were applied to the joints ; the patient got very speedy relief, and in a few days was out of bed. The heart had been carefully watched day by day, and while in bed no abnormal sounds were detected. After she had been up some days, the first sound over the apex of the heart was noticed to be much prolonged, and each day afterwards it was more easily detected ; when she went out of the hospital there was a marked systolic bruit at the apex. We do not imply that the blisters had anything to do with the after change, for the same fact is observed after other forms of treatment.

Would not the above observations lead us to think that under treatment we may perhaps suppress the symptoms without curing the disease ? The very cases in which we should fear that we might do so, are the subacute, which tends to

become chronic and insidious. When the constitution is vigorous, and the symptoms acute, it would, perhaps, be much more difficult to do so. When we have acute symptoms, however, the disease tends to get well; the acid secretions tell us how great is the effort that the body is making; it may succeed, and the patient be well in a few days; it may not have strength to finish the struggle, and the continuance of the symptoms day by day, and week by week, would probably indicate that the system is becoming exhausted, and wants assistance.

We would here finish these observations by remarking that we do not wish it to be understood that Dr. Gull considers that we ought to leave rheumatic fever to run its own course, but rather that the profuse acid perspiration, the acid saliva, highly acid urine of high specific gravity, and the other acute symptoms, are to be looked upon as favorable signs—that although they may be evidence of a highly rheumatic state of the system, there is also evidence, as these cases show, that the disease tends unaided to get well. Moreover, we would beg to mention that the natural history of inflammation has shown that the acute changes may subside, but the chronic changes still go on, rendering a vital organ less and less competent to perform those functions which are essential to our existence. The chronic condition may continue until some accidental circumstance again sets up acute changes, and completely exhausts the only power remaining in an organ essential to life. So it appears to be with rheumatic fever. A patient has an attack of that disease, recovers and appears well for a time; some comparatively slight cause brings about another attack; this may be again and again repeated; each attack damages the heart still more, until the muscular tissue has so degenerated that it is unable to perform its functions properly. The lungs in consequence become engorged, at last the patient dies, and the immediate cause of death is seen in the condition of the so-called “heart lung.”

The fact that comparatively slight causes, such as would have had at one time no effect, are at another time capable of exciting the disease, would seem to show that there is a chronic condition, favouring the action of such causes.

We would here, in ending these remarks, venture to quote Dr. Latham's words:—“There is a lesson which we are apt

to learn slowly, but all of us learn at last—it is this, that while present pain and present peril call loudly for relief and rescue, still, in relieving and rescuing, the ultimate well-being of the patient must not be disregarded altogether.”

A perusal of the above cases tends to show that the best treatment for rheumatic fever has still to be determined, and will also convince the reader (we think) that it is absolutely necessary to understand the natural progress of the disease before any conclusion can be arrived at concerning the operation of remedies. The cases show that too much importance has been attached to the use of medicines, especially in those acute cases where the tendency to a natural cure is the greatest.

FOUR CASES OF RHEUMATIC FEVER, TREATED WITH MINT-WATER ONLY;

WITH REMARKS BY

G. OWEN REES, M.D.

THE following cases, illustrating the natural history of rheumatism, are reported by Dr. Sutton, with whom I arranged that he should visit and watch them, day by day, in order that the occurrence of adverse symptoms might be immediately detected, and the case put under such treatment as might be considered necessary. It so happened, however, that no treatment was required, and the cases have therefore quite answered the intended purpose of showing what happens when the rheumatic disease runs a natural course.

In point of duration, these cases may be considered to bear comparison with the general run of those which have been submitted to approved plans of treatment.

It has been my practice for many years past, to exhibit lemon-juice in acute rheumatism, and from long experience I am of opinion that two of the patients might have been earlier relieved had I exhibited that remedy—upon which I continue to rely, as assisting to diminish general excitement and to lower the pulse. The great point here illustrated is, that when treating acute rheumatism we are dealing with a disease which seems to go on to cure quite unassisted, and that this happens even when it appears in the acutest form. As these cases were *absolutely* treated with nothing but mint-water, they will serve as a fair standard when testing the value of proposed remedies.*

* The first case, however, took an aperient, and one of the others had some brandy after recovery.

For my own part, the results have firmly impressed me with the belief that the old plan of treatment, consisting in the exhibition of calomel, opium, and antimony, and the free use of colchicum, did great harm, not only by retarding recovery, but by leaving the patient greatly debilitated. The duration of cases of acute rheumatism when I first became a student at Guy's Hospital was most certainly far longer than at present; when, whatever may be the treatment adopted, it partakes less of the heroic character than that which was practised by our predecessors.

In conclusion, I would mention, that the case in which relapse occurred is especially interesting, for the reason that the relapsed condition was treated on an improved modern principle, and recovered in just about the same time that nature, unassisted, had occupied in effecting the cure of the first attack.

Emma L—, æt. 23, admitted June 7th, 1865, into Esther Ward, under the care of Dr. G. O. Rees. Occupation, "an ironer in a laundress establishment." Says that seven days ago she got very wet, and, in consequence, caught cold, and next day had pain and stiffness in her limbs.

June 8th.—She complains of great pain in her joints, more especially in the left knee, which is swollen and very painful when moved; also says that she has occasional pains in nearly all her joints, and that she feels "very stiff." Both wrists are swollen and red. She is sweating very profusely, and the perspiration has the rheumatic odour strongly marked. The skin is hot. Her tongue is coated all over with yellowish-white fur, except in the centre part, which is red and dry; pulse 98; resp. 30. Has no pain in the chest. *Heart*.—Visible impulse diffused and unusually well marked. On applying the finger it is felt to be sharp and "knocking." Percussion showed the area of dulness somewhat increased, and the resonance diminished, but not actual dulness, as high as the second rib. The first sound over the base prolonged, and accompanied by a "crumpling-like sound." At the apex the first sound appeared normal. Ordered Julep. Menthæ ter die, Pil. Coloc. co. gr. x statim. Milk diet.

9th.—Says she is better; has less pain in the knees, but the right wrist is still painful, swollen, and red. Sweating freely, and perspiration smells sour; tongue very red at the tips and edges, and in other parts coated with yellow fur. Passed a better night. She thinks that she slept from 11 o'clock until about 5 o'clock next morning, and observes that she had not slept "for nights before." Bowels opened twice by the pills; pulse 96; resp. 36. The heart seems much the same, except that the first sound is more prolonged, and the crumpling sound more marked.

10th.—Complains of pain in the ankles, knees, and wrists; sweating very profusely; systolic bruit heard at the base. Rept. mist.

13th.—Pulse 88; resp. 32; pain and swelling in the knees and ankles, and passed a very restless night. Rept. mist.

14th.—Passed last night a very good night; pain very much better everywhere, except in the left wrist; perspiring very freely; pulse 80; resp. 39; systolic bruit at the base.

18th.—In no pain; tongue red and dry, and glazed in the middle; sweating very freely; pulse 88; resp. 30. Says that she feels much better. The bruit at the base diminished. Rept. mist.

21st.—States that she is much better, saying, "I am now able to feed myself." In no pain anywhere.

22nd.—Feels much better, but the pain has come back into the left wrist, but not so severely; tongue is quite clean; does not perspire much now; pulse 76; resp. 20. The first sound over the base is still remarkably prolonged, but cannot be considered an actual bruit. Rept. mist.

23rd.—Pain at the right wrist entirely gone; tongue clean. Says she feels very well and passed a good night, and that she can eat anything now. Heart much the same.

25th.—Entirely free from pain; appetite good; first sound at the left base still markedly prolonged, at the apex almost normal.

27th.—Improving. To get up to-day.

29th.—Slept all night. Free from pain. Tongue clean.

30th.—Free from pain. No perspiration; tongue clean. Has passed a very good night. Appetite very good. *Heart* much the same.

From this date she gradually recovered day by day; and in a week from this time went out into the grounds daily. As she was not in good circumstances at home, she asked to be allowed to remain in the hospital until she was quite well again, which Dr. Rees allowed her to do. All the time she appeared to be doing well; nevertheless the sound at the base did not subside, and on the 2nd Oct., three months after she had left the hospital, the heart was again examined, and no bruit heard.

Mary Ann S—, æt. 23, servant, admitted August 14th, 1865, under the care of Dr. Rees, into Esther Ward. Says that previous to seven years ago she had enjoyed good health, but never very strong. Seven years ago she had an attack of "rheumatism," but does not remember how long she was ill. Two years ago had rheumatic fever, and confined to her bed six weeks. Never been very strong since she had the rheumatic fever. Eight days ago she was suddenly seized with pain in her knee, and felt "very chilly," and cold. She went to bed, and "got in very great heat." The day after this she was in great pain in her right hip, and in both her knees. She perspired very much.

August 15th.—She now complains of pain in both her wrists and knees. The wrists are swollen and tender to touch. She is perspiring very freely, and the perspiration has the rheumatic odour strongly marked; tongue thickly coated with yellow fur; appetite very bad; pulse is not particularly quick. A systolic bruit, probably the result of the former attack, is heard over the apex of the heart. Aqua Menthæ ʒj ter die. Milk diet.

16th.—Says she is not in near so much pain. The joints of the right hand are swollen and painful; tongue still thickly coated in the middle, red at the edges. Is perspiring very freely, with the usual acid odour. Heart in the same condition.

18th.—Still in pain. Perspiring freely; tongue coated; expresses herself as

feeling better; bruit still heard. Dr. Wilks saw her to-day, in Dr. Rees' absence, and thinks she is doing well.

20th.—In much the same condition.

22nd.—Joints still very painful, especially the wrists. Perspiring very freely; tongue covered with yellow fur, edges red; bowels have not been open for three days; urine high coloured; no albumen, but a deposit of lithates; bruit is heard the same; pulse 100. Rept. mist.

23rd.—In no pain anywhere. Says she feels much better; her bowels have been relieved; her appetite is returning; pulse is feeble, but not particularly quick; heart's impulse diffused; the systolic bruit is heard very distinctly over the apex of the heart; urine high-coloured, about the normal quantity, sp. gr. 1030; no albumen; highly acid, with a deposit of lithates.

24th.—Free from pain, and remarked "I have been during the last week gradually losing the pain."

25th.—Stiffness of the joints gone. Tongue cleaner, but still coated in the middle, and the edges red; the joints are entirely free from pain; appetite better; perspiring very much less; saliva alkaline; perspiration does not give any acid reaction to test-paper; skin is cool; heart in much the same condition. Rept. mist.

27th.—Tongue much cleaner; appetite very much better; not in any pain; not perspiring; pulse 73; the bruit is still heard over the apex of the heart.

September 1st.—Free from pain. States that she feels very much better; saliva gives an alkaline reaction to test-paper. Rept. mist.

2nd.—Free from pain. Remarks that she feels quite well, and wants to get up; tongue clean.

4th.—Going on very well. All the symptoms have subsided, but the systolic bruit is still heard. Rept. mist. Middle diet.

5th.—Wished very much to have some beer, but ordered instead three doses of brandy a day. Middle diet. Rept. mist. menthæ.

6th.—Allowed to get up. She was very anxious to go out, and went into the hospital grounds without leave. Remained out some time, and next day, that is, the

8th.—Pain and swelling of both hands; the right she states is dreadfully painful, so much so that last night she could not sleep for the pain; tongue slightly furred in the middle; skin hot and perspiring, and smells sour; pulse 112 and feeble; bruit heard the same.

9th.—Pain in wrists and knees; wrists swollen. Dr. Wilks saw her to-day, and seeing her in great pain ordered Potassæ Bicarb. ʒss, Potassæ Acet. ʒ, Potassæ Niträt. gr. x, ex Aquæ ʒj, Succ. Limon. ʒss, effervesc., 3tis horis.

11th.—Pain in the wrists severe, and those joints much swollen; her knees also are swollen; is perspiring profusely.

12th.—Slept badly last night. In great pain, but the joints do not appear so much swollen.

13th.—Pulse 96. Slept better last night; in less pain, and the joints not so much swollen. The bruit is still heard under the nipple.

14th.—Pulse 72. In no pain.

17th.—Free from pain, but feels weak.

19th.—Much stronger.

20th.—Going on well.

Ellen S—, æt. 23, married, has had two children. Admitted into Esther Ward August 30th, 1865, under the care of Dr. Rees. Says that she had always enjoyed good health up to ten years ago, when she believed she had the ague. After she had recovered from that disease she remained well until two months ago, when she suffered with a very bad sore throat, which lasted about a week. From the latter attack she recovered, and continued well until fourteen days before admission, when she was suddenly taken with pain in the calves of her legs, "it afterwards flew into my knees and backs of my hands." She remained much in the same condition until she was admitted into the hospital.

August 30th.—She says she is in great pain in both her wrists, which are seen to be swollen and red, also pain in both her knees. She is sweating very freely, and the skin smells sour; her tongue is thickly coated; systolic bruit at the apex; no increase in the area of cardiac dulness. Ordered *Aquæ Menthæ* ʒj *ter die*. Milk diet.

September 1st.—In great pain. Her wrists are swollen and very tender; the rheumatic odour is well marked; her tongue is coated; no pain in the chest; bruit the same. Rept. mist.

2nd.—Not in so much, but the wrists are still in pain. Says she feels better; sweating freely.

4th.—Free from pain. Tongue cleaning in the middle, but still coated with yellow fur at the sides; perspiring freely. Says she passed a restless night, but not in pain. The cardiac dulness is normal; systolic bruit at the apex still heard.

5th.—Feeling much better. Pulse 100; free from pain; tongue clean.

6th.—Says that she is very much better. Entirely free from pain; tongue clean; did not perspire so much last night; skin has no longer the rheumatic odour. She remarked, "My skin does not smell as it used to do when I was very bad." Appetite very good the last three days.

9th.—Going on well.

13th.—Much better. In no pain. Out of bed.

Continued to do well, and went out of the hospital on the 27th of September.

James R—, æt. 18, occupation a turner, admitted June 14th, into Philip Ward, under the care of Dr. Rees. States that he has always enjoyed good health; that he has never had any illness, with the exception of an occasional headache, and once an abscess on one of his fingers. He moreover states that on June 11th he was very much fatigued in consequence of walking a great deal, and "when I got home in the evening I was so stiff I could scarcely move. Next morning, when I got up, I could just walk a little, but had a good deal of pain in my ankles, knees, and big toes." He went to bed, and he could not close his eyes all the night, on account of the great pain. On the third morning he could not get out of bed, and on same day he was taken to the hospital.

15th.—His ankles and feet are swollen and painful; his wrists also are painful, but not swollen. He is very thirsty; sweating profusely; pulse 90.

18th.—He complains of great pain in both his knees and ankles, and also in his right shoulder; these are swollen, and so tender that he cannot bear the bed-clothes to rest on his legs; is sweating profusely, and the skin is hot and smells very sour; his tongue is covered with white fur, and dry. Also complains of

great thirst; breathing quickly, 35 respiratory movements in a minute; the cardiac dulness is not apparently increased, but a soft, blowing murmur is heard over the apex of the heart. *Aquæ Menthæ* ʒj ter die. Milk diet.

19th.—Feels a little easier, but still in great pain; resp. 40; pulse 100.

21st.—In great pain, complains that the bed-clothes hurt him very much; resp. 40; pulse 98; sweating freely. The resonance over the precordial region is diminished, but there is no very marked increase of dulness. The first sound over the apex of the heart is prolonged, and accompanied by a soft blowing murmur; over the base also there is a systolic bruit. He is still breathing very quickly. Rept. mist. *Menthæ*.

19th.—He is almost free from pain; perspiring not nearly so much; pulse 100; resp. 30; heart in much the same condition.

21st.—Free from pain. Appetite "quite come back;" breathing much easier. Rept. mist.

23rd.—Entirely free from pain. Tongue clean; pulse 64; resp. 20; systolic bruit heard over the third left costal cartilage, also over the apex of the heart. States that he feels very much better. Rept. mist.

He continued every day to improve. The treatment was the same; no medicine of any kind except the mint-water and middle diet.

30th.—He states that he feels very much better, and that he is free from pain. His appetite is good; sweats a little, but not much; a systolic bruit is still heard over the apex, but not very distinctly; the first sound at the base is not accompanied by a bruit, but it is prolonged.

July 4th.—He goes out into the grounds daily.

19th.—Discharged cured.

No.	Initials.	Sex.	Age.	Married or Single.	Occupation.	Hea at view from pain, and Date at which the patient was free to the since cessati and n	Num
1	M. L.	Female	34 Yrs.	Married	Married woman	Jan. 20th	
2	E. S.	Female	21	Single	Servant	Nov. 6th	
3	J. C.	Female	29	Single	Char-woman	Dec. 1st	
4	E. B.	Female	25	Single	Laun-Pret	Aug. 8th	

FEMALES.

turned; 24th, again free from pain Nov. 15th	Taraxaci; Opii. gr. j,	
Nov. 27th	s horis; Julep. Menthæ ie	Effusion into both sides of the chest. Urine, Nov. 13th, sp. gr. 1033. 24th, 1025. Nov. 25th, urine, sp. gr. 1030.
Nov. 29th	SeTaraxaci, ter die, vel. 4; thertrat., gr. xv; ex Mist. m m	
Aug. 7th, feels better. Aug. 10	araxaci, ter die araxaci, 6tis horis araxaci, 6tis horis	Urine high coloured; pink sediment.
Nov. 3rd	ter die; Hyd. c. Creta, 28th, Julep. Menthæ lie	
Nov. 4th	die; brandy ʒiss. Low	
Oct. 30th much better. P. 78, R. 28	araxaci, ter die; Pulv. sit; brandy, ʒij. Milk	It is probable that the patient was recovering when admitted.
Aug. 5th	araxaci, ter die	
Aug. 16th	araxaci. 19th, Decoct. s die. Milk diet	

<p>o. Menthæ et Taraxaci, ter die. th, Ferri Ammonio Citrate</p> <p>o. Menthæ, ter die; Pulv. Doveri, cte manequæ, Emp. Littæ thoracis 10th, Julep. Quinæ Efferves. th, Julep. Menthæ et Taraxaci, - die; Opii, gr. j, o. n.; brandy ʒij</p> <p>. Doveri, gr. iij, hâc nocte; Julep. enthæ et Taraxaci, ter die.</p> <p>o. Menthæ et Taraxaci, ter die</p>	<p>throat.</p> <p>Remained for some time very weak</p> <p>She was discharged re- lieved.</p> <p>Complicated with throat affection</p>
<p>o. Menthæ et Taraxaci, ter die; ay 15th, Pulv. Doveri, gr. x, hâc cte; 19th, Ol. Ricini, ʒss</p>	
<p>o. Menthæ et Taraxaci, ter die; ov. 6th, Hyd. c. Creta; Ol. Ricini, st hor. quat.; Pulv. Opii, gr. ss, 1.; 18th, Pulv. Rhei Salinus statim.</p> <p>o. Menthæ, ter die. Milk diet.</p>	<p>25 oz. per diem of urine; large deposit of urates and acid; menstruated during the attack.</p>
<p>o. Menthæ et Taraxaci, ter die; yd. c. Creta, gr. iv, stat.; Pulv. idnitz, post hor. quat.</p> <p>o. Menthæ et Taraxaci, ter die; b. 6th, Hyd. c. Creta, gr. iij, stat.; . Ricini, post hor. quat.</p> <p>o. Menthæ, ter die</p>	<p>15th March, left arm was wrapped in cotton wool</p>
<p>o. Menthæ et Taraxaci, 6tis horis</p> <p>p. Menthæ, ter die</p> <p>p. Menthæ et Taraxaci, ter die</p> <p>p. Menthæ et Taraxaci, ter die</p>	

SELECT CLINICAL REPORTS.

(MEMOIR IV.)

By G. H. BARLOW, M.A., M.D.

Cardial obstruction, the result of intra-uterine disease.

MANY years ago I called attention in these 'Reports,' and subsequently in the 'Gulstonian Lectures' for 1845, to certain disorders of the thoracic viscera commencing in early youth. These affections appeared to consist, in the first instance, of a defect in the relative proportions of the lungs and the chambers of the heart; and in most cases the first morbid symptoms seemed to be referable to defective expansion or development of the lungs themselves. This defective expansion could in many instances be accounted for by the changes produced by antecedent disease. In others it was questionable whether the defective expansion of the lungs was the primary cause, or whether this defective development might not arise from a tendency to tubercle; the defective activity of the organ being, as it were, a conservative precaution to prevent its becoming so affected under increased activity. In others, again, the primary lesion appeared to be a narrowness of the trachea, which diminished the volume of air inhaled at each inspiration; this narrowness being obviously the effect of pressure of distorted vertebræ, or some similar cause. In other instances, again, the trachea was small, though there was no pressure from without to account for it; the question being, then, whether the narrowness of the trachea was the cause of the undeveloped lung, or the deficiency of the respiration from diminished volume of lung the cause of the smallness of its

duct, the trachea. Certain propositions seemed, however, to be pretty well established :

1. That defective capacity or expansion of the lungs, independently of any other lesion which could be regarded as antecedent to it, often produces engorgement, hypertrophy and dilatation of the right side of the heart ; the trachea, pulmonic artery, and the aorta being of less than their natural size.

2. That this condition often terminates fatally with engorgement of the liver, with anasarca and death from apnoea.

3. That in the male subject the fatal termination often ensues soon after the age of puberty, owing to the necessity for increased activity in the respiratory functions as manhood approaches, and the consequently increased evil of its deficiency.

4. That in the female the health often improves about the same period of life ; the ill effects of the defective expansion of the lungs being counteracted by the establishment of the catamenial function ; that they are apt to recur whenever this function is interrupted, and the symptoms recurring with greater severity and generally terminating fatally at the period of the cessation of menstruation.

5. That defective expansion of the lungs and of its consequent results may be induced by adhesion of the pericardium, which obstructs the free movement of the lower ribs and diaphragm, this result being produced without the occurrence of any valvular disease whatever.

6. That disease of the mitral valve (whether obstructive or regurgitant) will produce the same results by obstructing the pulmonic circulation ; as may also pleuritic adhesion, deformity of the chest, or whatever impedes the free expansion or development of the lungs in early youth.

7. That the effects produced by the adhesion of the pericardium above alluded to (proposition 5) may, both as regards the symptoms, abnormal sounds, and effect upon the pulmonic and systemic circulation, exactly resemble, or rather be identical with, those produced by mitral disease.

8. That similar effects may be produced by dilatation of the bronchial tubes (*e.g.*, that induced by whooping-cough) which, by compressing the parts of the lung immediately sur-

rounding the tube so affected, induces a greater or less amount of apneumatosiis.

The following case will, I think, form a not inappropriate sequel to the above, as it affords an instance of the same form of disease originating, if not before birth, certainly very shortly after it.

Febrile disease of the mother shortly before delivery; lividity of the child; subsequent dyspnœa; increase of symptoms about the age of puberty; engorgement of heart, lungs, and liver; dropsy; death from apnœa.

(Reported by Mr. ARTHUR TAYLOR and Mr. A. B. SHEPHERD.).

Alfred B—, æt. 21, admitted into the clinical ward November 9th, 1864. His mother states that when he was a child, the surface of his body became blue when she washed him, as did his lips and fingers on exposure to cold. At the age of twelve he could run any distance without getting out of breath. Some years ago some gunpowder was given him rolled up as a cigarette, which he put between his lips and lighted. In consequence of this he was laid up for a month with vomiting and offensive bloody stools. Three years ago he attended at the Surrey dispensary with pain in his side; and eighteen months ago he first noticed that his ankles swelled, and his breath became short; and, as these symptoms increased in severity, he was six months ago admitted into Stephen ward under Dr. Rees. At the end of three weeks he went out much relieved.

During the last few cold days his dyspnœa has much increased. On admission the veins of the lower extremities and scrotum appeared much enlarged, and the integuments generally are œdematous. There is orthopnœa; respiration 54; right side of chest resonant as low as the nipple, but apex imperfectly resonant; præcordial dulness not excessive; tubular breathing at left apex; cooing respiration over the rest of the thorax. Heart sounds irregular; the first and second alike; no *bruit* to be heard; pulse irregular, either jerking and not to be accurately counted. Abdomen tense, tympanitic in front, dull at sides; thrill to be felt on percussion laterally; area of resonance changed by position. Liver felt between two and four inches below the ribs. Occasional vomiting; he has had some epistaxis, which has relieved him; he sleeps badly; bowels regular.

He was ordered acetate of ammonia with Nitric. Æth.—Pil. Conii co., Pil. Salle co. āā gr. v, nocte maneque.

November 11th.—Very little sleep; urine small in quantity, loaded with lithates; not albuminous.

12th.—Vomited this morning; resp. 60; urine rather increased in quantity.

14th.—Slight epistaxis; urine rather diminished. Sp. Æth. Nit. ℥xx; Infus. Digitalis 3j; Sp. Ammon. Aromat. ℥xx; ex Mist. Camph. ter. die.

15th.—Passed twenty-five ounces urine, sp. gr. 1015, yesterday up to 12 o'clock at night. Faintness, with pain across the epigastrium occurred three times after the first dose of digitalis; skin over sacrum red and purple.

16th.—Forty-four ounces of urine passed yesterday; pulse more full; abdomen less tense; the dose of infusion of digitalis to be increased to a drachm and a half.

17th.—Seventy ounces of urine yesterday, of sp. gr. 1010.

18th.—One hundred and four ounces of urine passed yesterday.

19th.—Very much better; heart sounds more natural. Rep. mist. bis die.

On the 22nd he had some swelling on left side of neck, with a sensation of heat and loss of appetite. He was accordingly ordered some saline medicine, and on the 24th was much better.

On the 28th he had great pain in the head, with slight epistaxis and vomiting; these, however, passed off after free action of the bowels; and on the 1st of December the patient got up and dressed for the first time; the liver then extended only a very little below the margin of the ribs. He passed a moderate quantity of urine; exertion always brought on a distressing attack of dyspnœa.

On the 20th, the weather having become cold, his lips became very livid, and his breathing short. He remained in the hospital till the 20th, always evincing great susceptibility to changes of temperature. When he left the hospital he was much relieved; the quantity of urine passed was large.

On the 18th of January, 1865, he was readmitted under the care of Dr. Rees.

The report states, his body is in a general state of œdema, with the exception of his head; lips livid, as they have been

all his life. Petechiæ over chest and abdomen; dulness under right scapula; no cardiac murmur; there is a thrill between the beats of the pulse, so that they are indistinct; urine scanty. Ordered Pulv. Rhei c. Cal. statim.

20th.—Tinct. Hyos. ʒss; ex Mist. Camph. ter die.

On the 22nd he was ordered three drachms of infusion of digitalis every four hours. This, however, was not continued, and Dr. Rees prescribed for him some effervescing citrate of ammonia.

On the 25th his cough had somewhat increased, but he breathed rather more easily. He was carefully protected from cold, and on the 27th he breathed much more easily.

Feb. 1st.—He was very nearly of a natural colour, and had very little cough when sitting up, though lying down increased it; he breathed more freely.

8th.—The patient now says that the shortness of breath has only existed for the last eighteen months, but that he has been livid from childhood. Both sides of his neck, just above the clavicles, but particularly the left, are thickened. The skin over the sternum is œdematous, and on the upper part of the back and cervical regions the veins are congested. The respiration is almost entirely diaphragmatic; the abdomen very prominent, and the middle of the back protruding.

6th.—No bruit, but apparently a double beat both at the heart and wrist.

14th.—Ordered Pil. Ipecac. c. Conii gr. v night and morning, and to continue the effervescing draught.

15th.—Has felt very ill, and experienced a sensation as of something breaking in his stomach, and vomited a quantity of frothy matter, containing small masses of thick tenacious mucus, of black and yellow colours alternately; after this he became unable to lie down, his cheeks and lips livid, and his breathing short and difficult.

16th.—Ordered Pulv. Ipecac. c. Opii gr. v every night.

20th.—He has had no more vomiting, but has discharged some mucus tinged with blood from the nose. The cough is induced, and dyspnœa increased by lying on his back or left side. By Dr. Habershon's permission he sat up for an hour in the evening.

21st.—Feels better, which he attributes to sitting up.

22nd.—Much better; retching continues, but nothing but flatus is expelled; no bruit; urine again scanty. Potass. Bitart. for drink.

24th.—Sp. Æt. Nit. ʒss; Sp. Amm. Arom. ℥xx; Syrup. Amant. ʒj; Decoct. Seneca ʒj ter die; rep. Pil.

March 10th.—Vomits his medicine; sits up daily, and says he feels relieved by it. Passes very little water, and is as blue as ever. Complains of great oppression at the epigastrium.

18th.—Abdomen more swollen; expectorates little blood; abdominal walls œdematous.

20th.—Stools pale; ordered jalap enemas.

22nd.—A catheter (No. 7) was passed, and an ounce of clear dark urine was drawn off. The abdomen was then tapped, and seven pints of fluid were withdrawn. It was of a clear pale-brown yellow; sp. gr. 1015 whilst warm, and 1019 when cold. A white, flocculent, slimy deposit, rapidly settled, and another of similar appearance, but rather less dense, was slowly coming down on the following day. Pus-cells were seen under the microscope by the addition of acetic acid. After the operation the pulse became more regular, and the patient expressed himself much relieved.

23rd.—Pulse very slow, less regular than yesterday, and has still the double beat; liver to be felt below the margin of the ribs.

April 4th.—Still vomits his medicine; belly much swollen; urine scanty and albuminous.

10th.—Was confined to bed, much distressed, and livid over the whole surface. Passed to-day ʒij of urine loaded with urates, and containing a slight quantity of albumen. There is no bruit, but heart's action is irregular; the lower part of the chest dull, with increased vocal resonance. Respiration feeble over upper part. Tinct. Digit. ℥x; Pot. Acet. ʒj; Sp. Æt. Nit. ℥xx; ex Mist. Camph. ter die; Pil. Scillæ cum Hydr. gr. x om. noct.

11th.—Passed ʒv of urine; feels better.

14th.—Coughs up a glairy mucus, slightly tinged with blood.

15th.—Expectorates less; abdomen enlarged; urine ʒvj, still loaded with lithates.

17th.—Has passed 3xvj of urine, without any deposits or albumen.

27th.—The carotids on both sides of the neck beat normally; venous pulsations on the right side of the neck, apparently partly regurgitant, and partly auricular. Ordered Pot. Iodid. gr. iij, c. sing. dosib. Julep. Ammon. ter die.

29th.—In very great distress; orthopnœa; great œdema of the genitals, and some of the legs.

31st.—Abdomen nearly as much distended as before the tapping; voice weak and husky.

On the 5th of May he was transferred to the care of Dr. Wilks; there was then scarcely any change in his condition, except that he seemed to be gradually getting worse. His dyspnœa became most urgent, especially when he was in bed, compelling him to sit up. His cough troubled him at night, and his expectoration was tinged with blood; heart sounds and pulse unaltered; respiratory sounds imperfect; abdomen filled with fluid, and painfully tense; his face and hands were puffy, and his legs and scrotum swollen. He had no appetite and no sleep; his bowels were never relieved unless acted upon by drugs.

On the 7th he was ordered Pulv. Jalap. co. ʒij p. q. n. His diet was continued, with the addition, at his own request, of twelve oysters.

On the 13th his urine was scanty, $6\frac{1}{2}$ oz. passed between 8 p.m. and 7 a.m.; on the 10th and 11th, loaded with urates, and slightly albuminous; sp. gr. 1028. The livid congestion of the whole body increased from day to day.

On the morning of the 16th he was blue and breathing laboriously. And at 3.30 he became, according to the sister's account, as blue as a damson, and died somewhat suddenly.

After his death his mother stated that she had a fever a short time before his birth; according to the father's account this fever was typhus, and very severe.

The body was carefully examined by Dr. Wilks, and was universally anasarcaous, and congested in the upper part.

Head not examined.

Chest on right side contained about two pints of fluid; pulmonic pleura much thickened; left lung universally adherent to the chest, tough, and in parts airless; pericardium universally

adherent to the heart, immensely thickened, especially at the lower and right side, where, almost on the right auriculo-ventricular septum, there was a plate of ossific deposit; the pericardium was so closely incorporated with the muscular tissue, that the two could not be separated without laceration.

Heart enlarged and altered in shape; this was especially due to the enlargement of the two auricles, each of which was at least double the normal size. The dilatation at their entrances, of the venæ cavæ on the one side, and the pulmonic veins on the other, added to their large dimensions. The right auricle was firmly adherent to the lung behind, and the pericardium in front. The vena cava superior was of ordinary size; the vena cava inferior much distended at its passage through the diaphragm, and at its entrance into the auricle; this seemed due to the general dilatation which the auricle had undergone. The opening of the coronary vein, and its valve, were of immense size. The fossa ovalis was depressed, and the membrane very thin, at its edge was a valvular opening through which the point of the finger could be passed into the left auricle; the opening was quite covered by the overlapping margin of the membrane; and this, in all probability, effectually prevented the passage of any blood. The left auricle was larger than natural, but less than the right. The ventricles were each of the normal size, or perhaps somewhat smaller; the pulmonary artery was healthy, and of ordinary size; the trachea small. The muscular coats thin; the muscle yellow, pale, and flabby; the aorta small, and the walls thin; the tricuspid, mitral, and aortic valves healthy. There was a large quantity of fluid in the abdomen; liver large and nutmeg; spleen and kidneys healthy.

It will, I think, be at once perceived that the foregoing case presents many points of interest, as well therapeutic and practical, as pathological. The history commences in intra-uterine life, the mother having had a severe fever a short time before her delivery; what this fever was does not certainly appear, for though the husband said it was typhus, it is not certain that it may not have been of some other character; nevertheless there can be little doubt that it was a blood disease, and we know that all morbid blood poisons, but especially those of rheumatism, the exanthems, typhus, and influenza, are capable

of exciting inflammation in the serous cavities. That the child had some defect about his organs of circulation and respiration, is rendered apparent by the fact of his becoming blue when washed, or when exposed to cold. That this difficulty in the aeration of the blood and in the extreme circulation was connected with the effects of pericarditis, is rendered highly probable by the fact that there was evidence of, upon inspection, very old pericardial adhesion, which had proceeded as far as ossification. It is probable, too, that the pericarditis which was the cause of this was intra uterine; the fact that we could get no account of any illness which could be construed into rheumatism or pericarditis, between the period of his birth and his final illness.

That the pulmonic circulation may be obstructed by pericarditis acting *mediately* through the impediment opposed to the respiratory movements I have pointed out in the communication already alluded to.* It is, however, remarkable that during childhood his health seems to have improved, as at the age of twelve he could run a considerable distance without getting out of breath. Here we have probably an instance of one of those contrivances by which nature often counteracts the effect of permanent changes of structure, by varieties in the development of other parts; for while we found after death that the ventricles of the heart were contracted, and in a manner strangulated, especially the right, or pulmonic ventricle, the auricles were immensely dilated and hypertrophied, the active cavities being the auricles. The probable condition of this youth, then at the age of twelve or thirteen, was that he had chest and trachea of little less than normal dimensions for his age, the heart being grasped at the base by a ring of thick membrane, which at that age had hardly begun to ossify. It is likely, too, from the condition of the fossa ovalis, that the blood might pass from the right to the left auricle, when the latter became much distended under more than ordinary exertion, by which means the distress from such effort would be averted. With this condition of the organs of his chest he had probably sufficient capacity for respiration to meet the requirements of early youth; so that it is not until approaching manhood that we hear of serious distress. The next important

* See 'Guy's Hospital Reports,' 1st series, vol. vii, (1842) p. 487, *et seq.*

event in his clinical biography is the occurrence of pain in the side at the age of between seventeen and eighteen ; for the effects of the foolish practical joke of making him inhale lighted gun-powder seem to have been only transient. He was then at the period of life when the activity of the pulmonic circulation and volume of air inspired undergoes a rapid increase in the healthy male ; but as this was impossible, owing to the condition of his heart, lungs, and trachea, he would become painfully sensible of the effects of distension of the right side of the heart, enclosed by a circle of thickened membrane, and consequently we find that he attended at the dispensary complaining of pain in his side ; though it does not appear that he was laid up with any acute disease, the continued effect of this obstruction to the circulation would be engorgement of the liver and scanty urine—of the latter we do not hear anything, as it is not a symptom which he would have been likely to notice ; the continued obstruction to the return of the blood along the ascending cava, manifested itself in the course of rather more than a year, in oedema of the lower extremities ; and from that time till the period of his death, the case took the ordinary course of one of obstructed pulmonic circulation, whether arising from disease of the heart or lungs, and was accelerated, in all probability, by his proneness to intemperance.

In regard to the semeiology and therapeutics in this case, it may be remarked that we had two symptoms which almost always attend disease of the mitral valve : namely, irregularity, or extreme smallness, of the pulse, and scanty urine. Now, although we had in this case no disease of the mitral valve, yet we had what is its ordinary consequence, pulmonic engorgement, and this pulmonic engorgement, equally with the disease of the mitral valve, which is its frequent cause, gives rise to a small or intermittent pulse, by obstructing the free supply of blood to the left ventricle. On the other hand we had not the systolic murmur near the apex of the heart, which is by many considered as diagnostic of mitral regurgitation, not so much, I believe, because there was no disease of the valves, as because there was wanting its almost necessary consequent distension of one or both ventricles. Still we had the general condition of obstructed pulmonic circulation, or, in others words, of obstruction tergal to the mitral valve ; and these include a state

of circulation the very opposite to that which occurs when the obstruction is distal to the mitral valve. Of this latter condition I would take aortic regurgitation or obstruction, as a typical instance, where the pulse is full though compressible, and seldom intermittent, and the urine abundant; and I would here remark that we shall often find it of practical utility to divide diseases of the circulation into two large classes, those usually in which the obstruction is tergal to the mitral valve, and those in which it is distal to it; the symptoms being, as we have just pointed out, the very opposite in each case, and in illustration of this I would remark upon the remedies, which, as far as was possible, were available in this instance. Now, all who have had much experience in the treatment of cardiac disease, must be aware that among the means of giving relief to the circulation, there is none more certain than the action of purgatives, or rather hydragogues; and this applies especially to diseased mitral and the cognate affections; and in this case the beneficial relief afforded by the Tinct. Jalap. co. was so marked that the patient would ask for its repetition of his own accord. Again, it is in disease of the mitral, and those affections which so closely resemble it, and are often mistaken for it, and which I have placed in the same category, that digitalis is especially serviceable; and in this case the benefit derived from that drug was unmistakeable; and I would here add, as the result of considerable experience in cardiac disease, that in cases of this class, where it might be said that the character of the pulse resembles that produced by digitalis, it may be employed with confidence, though always with caution; whereas, in those cases in which the obstruction or regurgitation was distal to the mitral valve, and of which I have adduced aortic disease as the typical instance, digitalis is of little service, and its use attended with much risk; ammonia and senega, with moderate stimulation being the appropriate remedies.

A DESCRIPTION OF THE APPEARANCES
OF THE
HUMAN EYE IN HEALTH AND DISEASE,
AS SEEN BY THE
OPHTHALMOSCOPE.
(*First Series.*)

By C. BADER.

NOTE.—*Abbreviations* : Os. = ophthalmoscope. Od. = optic disc, that is the portion of the optic nerve which is seen with the ophthalmoscope, surrounded by the sclerotic, choroid, and retina.

THE most important step of every os. examination previous to looking at the details of the retina, choroid, &c., is the determination of the shape of the eyeball, or, more properly speaking, of the distance from the yellow spot to the point (nodal point) in the eye where the rays coming from an object cross each other, supposing the curvature of the crystalline lens and cornea and its relation as to distance from the crystalline lens to be normal. An eye in which this distance from the yellow spot to the nodal point is too long, *i. e.* exceeds that of the normal (emmetropic) eye, is termed an elongated (enlarged) or myopic eye. An eye in which this distance is too short, *i. e.* does not equal that of the emmetropic eye, is termed a short or hypermetropic eye. In this sense we speak of too large, or myopic, and of too small, or hypermetropic, eyes.

By recognising with the os. whether an eye is normal shaped or too large or too small, we at once possess the key, not only to the treatment of the anomaly of shape, but also to a large series of morbid and other changes which we may expect to find in such an eye.

1, 2, and 3 of the Plate represent on an enlarged scale the appearance of a portion of the optic disc (2), or of its image (1 and 3), and of the adjoining fundus (*i. e.* of the sclerotic, choroid, and retina round the od.) of the left eye of three different persons (age fifteen) with blue irises, viewed at the distance of about nine inches from the eye with the ophthalmoscope alone (a slightly concave glass mirror, some of the metal having been removed from its centre to establish a sighthole).

This mode of os. examination of the od. is termed "examining the od. directly." The patient is seated as is usual for the os. examination, and directed to look straight out at some distant object. To be able now to judge of the shape of the eye in the sense above stated, we look with the os. for the place occupied by the od, as the object which presents the most definite outlines reflects most light, and is nearly level with the yellow spot. The od. occupies a portion of the interior of the eye, situated inwards from and a little below level with the yellow spot. We have to throw the light with the os. in this direction, placing ourselves at a distance of from nine to twelve inches from the eye, the latter being directed straight forwards, while we with the os. look through the outer part of its pupil into it. A brilliant yellowish white or white reflection (see the outer and upper part of 1) peculiar to the od. of the healthy emmetropic eye is at once observed. Those who are less practised in the use of the os. examination will readily find this reflection (the recognition of which very much facilitates the more minute examination of the od.) by sitting opposite the patient and stretching out the little finger of the hand which holds the os. The patient is directed to look at the tip of the little finger, which, while the examiner looks through the sight-hole of the os. into the eye of the patient, will cause the yellow spot of the latter to be directed towards the tip of the finger, while the od. comes to stand opposite the sight-hole of the observer's os., and instead of a red reflection from behind the patient's pupil, he will observe a brilliant whitish one peculiar to the od. The beginner should select for examination persons with "brown eyes;" in these the contrast is greater between the reflection from the od. and that from the adjoining fundus.

As soon as from the reflection perceived we know that we are looking at the od., we slowly approach the eye in a straight line,

taking care continually to throw the light through the pupil and not to lose sight of the reflection peculiar to the od. On approaching very near the eye, only a small (the central) portion of the os. remains available for throwing the light through the pupil, and some practice is required so as continually to illuminate the od. As long, however, as we do not lose sight of the reflection peculiar to the od., we can be sure that we are handling the os. properly.

From the degree of distinctness with which we see with the os. the od. and the blood-vessels in it, while approaching the eye, we diagnose the shape of the eyeball.

With some practice we can approachingly determine in this way the kind and strength of the spectacles required to correct the anomaly in the refraction occasioned by the faulty shape.

To return to the Plate, let us designate the persons from whom 1, 2, and 3 of the Plate were taken, as No. 1, No. 2, and No. 3, and their pupils fully dilated by atropin (which is unnecessary if the ophthalmoscopist is expert). We place the three persons as is usual for the os. examination, and direct them to look straight out at some distant object. We successively examine the left eye of each. Let us suppose ourselves to be placed with the os. at a distance of nine inches from No. 1's eye, and that we have succeeded in obtaining the reflection peculiar to the od. as represented in 1 of the Plate.

We will find, in examining No. 2 exactly in the same manner, that we obtain, not an ill-defined, as in No. 1, but a perfectly distinct view of a small portion of the od., of a few of the retinal vessels passing through it, and of some of the adjoining fundus, as shown in 2 of the Plate; and that we see the more, and often the whole of the od., as we approach the eye while examining.

On proceeding with the os. examination in the same manner as in No. 2, in No. 3 we notice as regards distinctness of outline, a similar view as in No. 2, but we can overlook at once a larger area of the (inverted) image of the od., &c.

Now, on approaching No. 1 to within one inch from the eye, while keeping in sight the reflection from the od., we obtain an ill-defined view of part of the od. itself, and of the retinal vessels in it. While on approaching No. 2 in the same

manner we perceive the od., vessels, &c., most clearly. The same manœuvre in No. 3 causes the image of the od. to become the more ill-defined the nearer we go. Already two inches from the eye it is changed into a mere brilliant white reflection. This change of distinctness on approaching the eye suffices in all cases to distinguish the myopic from the hypermetropic eye.

To sum up the above, (1) we find in No. 1, 2, and 3, a difference in the distinctness with which we see the od. From this we infer a difference in the shape of the three eyes. (2) We find on approaching No. 1, 2, or 3, a change of this difference of distinctness. If the od. appears the more distinct the nearer we go, we pronounce the eye to be too small (hypermetropic). If the od. (in this case its image) appears the more indistinct the nearer we go, we recognise the eye as too large (myopic).

The above can readily be produced artificially, as also the variations, to which different degrees of myopia or hypermetropia may give rise by making the following experiment :

On a small square piece of paper mark a dot, and at the distance of one eighth of an inch from it (being in the healthy eye the average distance of the yellow spot from the nearest margin of the od.—choroidal aperture), sketch a circle with a diameter of one eleventh of an inch (being the average diameter of a healthy od. at the choroidal aperture), with a small cross close to its margin, so as to control the position, inversion, &c., of the circle when viewing it or when observing its image. Place the paper so that the dot comes to stand into the focus of (one inch from) a biconvex lens of one inch focal distance, the circle occupying as near as possible the place of the od. relative to the dot. If then (supposing our eye to be healthy and emmetropic, or made so through the addition of suitable spectacles), we use the os. as directed in No. 1, 2, and 3, we observe the same changes as to distinctness, &c., of the circle, as seen in the od. of No. 2—if we move the piece of paper away from the focus of the one-inch lens, and place it one eighth of an inch nearer the lens—or as seen in the od. of No. 3 if we move the piece of paper one eighth of an inch away from the lens, so that it comes to stand at one and one-eighth of an inch from it.

DESCRIPTION OF PLATE.

The accompanying Plate shows—

1. An enlarged view of the image of the inner and lower portion of the optic disc and of the adjoining fundus of a healthy (and emmetropic) left eye.

The brilliant yellowish-white portion above and to the right represents the image of the portion of the optic disc. This colour shades off into a red one, which is due to the choroid. Through the light reflected from the inner surface of the white sclerotic passing through the transparent walls of the vessels of the choroid filled with blood. This red colour appears the more brilliant the less the pigment of the choroid impairs the passage of light through its blood-vessels.

2. An enlarged view of the inner and upper portion of the optic disc and of the adjoining fundus of a hypermetropic left eye.

The brilliant pale yellowish-white portion represents part of the optic disc. The red portion, as in 1, represents some of the adjoining choroid.

The boundary between “the red” and the optic disc is sharply defined, which in hypermetropic eyes is frequently not the case, an irregular pigmentation of the choroid marking this boundary. Portions of a retinal artery and vein are represented passing across the optic disc.

3. An enlarged view of the image of somewhat more than the upper half of the optic disc with several of the retinal blood-vessels and of the adjoining fundus of a myopic left eye.

The image of the oval shaped optic disc has a brilliant pink colour, which is strongest along the margin. The greater portion of the disc is surrounded, not by blood-carrying choroid, but by choroid which, through atrophy, has become transparent. Thus the brilliant yellowish-white part joining the left and lower margin of the optic disc as seen in 3 (being in reality the outer and upper margin of the disc) is the inner surface of the sclerotic, from which the reflected light returns through the atrophic transparent choroid, through the retina, &c., to the observer's eye. The uniformly red part along the lower margin of 3 represents the healthy choroid. The transition from this to the transparent atrophic portion is sudden, which is the exception. Generally a less atrophic portion intervenes.

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LIST
OF
GENTLEMEN EDUCATED AT GUY'S HOSPITAL,
WHO HAVE PASSED THE
EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,
&c. &c.

University of London.

EXAMINATION FOR THE DEGREE OF DOCTOR OF MEDICINE.

Walter Moxon. | Thomas Stevenson.
*Philip Henry Pye Smith, B.A.

SECOND EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.

First Division.

†John Albert Nunneley. | William Frank-Smith.
‡John Jones Phillips.

FIRST EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.

ENTIRE.

Second Division.

Thomas Alpheus Buck. | Henry Morris, B.A.

EXCLUDING PHYSIOLOGY.

First Division.

George Rolph Raine.

Second Division.

Joseph Priestnall Cheetham. | Reginald Eager.

PHYSIOLOGY ONLY.

Second Division.

Paul Henry Stokoe.

* Obtained the Gold Medal.

† Honours in Medicine and Midwifery.

‡ Obtained the Gold Medal for Midwifery.

452 Gentlemen admitted to Practice since September, 1864.

PRELIMINARY SCIENTIFIC EXAMINATION FOR THE DEGREE OF M.B.

First Division.

Albert Henry Baines.
*William Arthur Brailey.
Edward Colson.

†William Field Flowers, B.A.

Robert Harris.
Peter Thomas Scott.
George William Shipman.

Second Division.

William Turner.

University of Cambridge.

FIRST EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.

George Mickley, B.A.

University of Aberdeen.

EXAMINATION FOR THE DEGREE OF DOCTOR OF MEDICINE.

William C. Lucey.

EXAMINATION FOR THE DEGREE OF MASTER OF SURGERY.

William C. Lucey.

Royal College of Physicians of London.

EXAMINATION FOR MEMBERSHIP.

Thomas Stevenson, M.D.

EXAMINATION FOR LICENTIATESHIP.

John Jones Phillips.
Chauncy Puzey.
Frederick Thomas Fagge.
Edwin Burrell.

Henry Charles Hilliard.
George Paddon.
Ebenezer Fulham Turner.

FIRST EXAMINATION FOR LICENTIATESHIP.

Richard Bottomley Nowell.
William Joseph Marsh.
George J. B. Stevens.
Henry S. Taylor.
William Harris Butler.
Alfred Harwood.
Osmer King.

Samuel John Truman.
Herbert Goldingham Budd.
Benjamin Neale Dalton.
Arthur Bowes Elliott.
Henry Morris.
William Spratt.

* Obtained the Scholarship for Biology.

† First Class Honours in Chemistry and Natural Philosophy.

Royal College of Physicians and Surgeons (Edinburgh).

EXAMINATION FOR LICENTIATESHIP.

John Gittins.
Edwin Fairland.

Jonas Richard Leake.
George Fowler.

EXAMINATION FOR LICENTIATESHIP IN MIDWIFERY.

John Gittins.
Edwin Fairland.

Jonas Richard Leake.
George Fowler.

Royal College of Surgeons of England.

EXAMINATION FOR FELLOWSHIP.

NOVEMBER, 1864.

Frank Buszard.

EXAMINATION FOR MEMBERSHIP.

NOVEMBER, 1864.

James William Smith.
Henry Dawson.
John Cornelius Dwyer.

Edward Coleridge Roberts.
John G. F. Wilford.
Olliver Thomas Duke.

JANUARY, 1865.

Frederick Sutton.
Frederick William Armitage.
Charles Glen Bott.
Charles Broom.

Henry Greenway Howse.
Alfred Charlton.
Robert Orme.
Arthur Taylor.

APRIL.

John Gill.
H. D. Reynolds.
Jabez Thomas.
Henry Whiting.
Jonas Richard Leake.
Herbert Lucas.

George Rendle.
Robert W. S. Barraclough.
John Batteson.
John Arthur Ensor.
Frederick W. Humphreys.
George W. Malim.

MAY.

John Gittins.
Henry Charles Hilliard.
Frederick M. Rickard.
James D. Rowlands.
Nelson A. Hilder.
John King.

William J. Marsh.
David Shoolbred.
Richard Harris.
William Hawett.
Henry Bowden Lyle.
James Milward.

JULY.

William Harris Butler.
Richard James Andrews.
Benjamin Gowing.
William T. J. Hicks.

Henry Denne.
Robert Elphinstone.
Clement Palmer.
Henry Weekes.

454 Gentlemen admitted to Practice since September, 1864.

EXAMINATION FOR LICENTIATESHIP IN MIDWIFERY.

**Henry James Dwelly.
Thomas Collier.
Augustin Barber Fry.**

**William Melville Knipe.
Jonas Richard Leake.**

FIRST, OR ANATOMICAL AND PHYSIOLOGICAL EXAMINATION.

NOVEMBER, 1864.

John Gittins

David Shoobraid.

JANUARY, 1865.

**Edwin James Fairland.
Walter E. Greene.
Nelson A. Hilder.
Henry B. Lyle.**

**Henry G. Shorter.
James Thorne.
W. E. Wright.**

APRIL.

**E. L. Crowther.
T. B. Dyer.
Herbert W. Fagge.
W. Johns.
R. C. Lucas.
A. Matthews.
H. Maynard.
E. M. Owens.
W. J. Richards.
G. Spearman.
Benjamin N. Dalton.
Arthur B. Elliott.
W. P. Boyle.
J. P. Cheetham.
J. W. Morris.
James Rawlings.
S. Key Watson.**

**James W. Cooke.
George S. Elliston.
H. K. King.
C. J. W. Meadows.
Henry Moon.
George Rootes.
Charles Sangster.
J. R. Stocker.
Samuel J. Truman.
W. G. Palmer.
T. A. Buck.
F. A. Thomas.
Douglas Wills.
Arthur Goodwin.
G. F. Trotter.
W. F. Thurston.
W. H. Rawlings.**

MAY.

**John Jenkins.
William Spratt.
J. C. Chester.
Walter Greene.
Richard Tudge.
Charles Nutt.
Christopher Jordison.
W. B. Giles.
W. C. Toulmin.**

**Henry Warlow.
John Williams.
Charles W. Eccles.
Charles Hedley.
Charles Gurdon.
Oswald H. Foster.
William Stanger.
T. C. Marsh.
Henry Lyne.**

JULY.

**H. P. Banks.
Henry Cheesman.
E. N. Edwards.
F. W. Fowke.
Jacob French.**

**Richard Morgan.
J. W. Morison.
J. L. W. Ward.
A. F. Bossy.**

Apothecaries' Society.

FINAL EXAMINATION FOR LICENTIATESHIP.

SEPTEMBER, 1864.

William Henry Vipau.		George Fowler.
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NOVEMBER.

Henry Richard Smith.		Henry Octavius Steele.
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DECEMBER.

Robert Charles Earle.		Thomas Collier.
Robert Edward Owen.		Frederick Manser.

JANUARY, 1865.

Charles Broom.		John G. F. Wilford.
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MARCH.

Thornton Gerald Simpson.		Edwin Burrell.
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MAY.

Charles Glen Bott.		Henry Whiting.
Ernest Last Fyson.		

JUNE.

Richard James Andrews.		James D. Rowlands.
Herbert Lucas.	|	

JULY.

Isaac Thomas Bridgman.	|	Herbert B. Spurgin.
Edward Coleridge Roberts.	|	John Bateson.
Jabez Thomas.	|	

AUGUST.

George W. Malim.	|	Olliver Thomas Duke.
Henry Weekes.	|	John Gittins.
Edwin Fairland.	|	Nelson A. Hilder.

FIRST EXAMINATION FOR THE LICENTIATESHIP.

NOVEMBER, 1864.

Robert Stuart.

DECEMBER.

Benjamin C. Gowing.	|	George Rolph Raine.
Hardwick H. Braye.	|	James D. Rowlands.

JANUARY, 1865.

Thornton Gerald Simpson.

FEBRUARY.

Ridgway R. S. C. C. Lloyd.

MARCH.	
William Evatt Wright.	John H. Croft.
APRIL.	
Henry Cecil Smith.	Samuel J. Truman.
JUNE.	
George Birch.	Arthur Bowes Elliott.
William Spratt.	Joseph P. Cheetham.
Benjamin N. Dalton.	
JULY.	
John Williams.	George Spearman.
James W. Cook.	James H. Walters.
Edward L. Crowther.	Henry Warlow.
Thomas B. Dyer.	
AUGUST.	
Charles G. Gurdon.	Charles Sangster.
John Jenkins.	Charles Hedley.

OCTOBER, 1864.

SILVER MEDAL AND BOOKS FOR MATERIA MEDICA AND
PHARMACEUTICAL CHEMISTRY.

Stephen Wootton Bushell.

GUY'S HOSPITAL MEDALLISTS AND PRIZEMEN, 1864-5.

EXAMINATION OF STUDENTS IN MEDICINE AND ITS

ALLIED SCIENCES, AUGUST 3RD, 1865.

THIRD YEAR'S STUDENTS.

Henry Denne, Sandwich, the Treasurer's Gold Medal for Clinical Medicine.

John Gill, Weston, Hawkstone, Shrewsbury, the Treasurer's Gold Medal for Surgery.

Henry Denne, Sandwich, first Prize, £40.

John Gill, Weston, Hawkstone, Shrewsbury, second Prize, £35.

Henry S. Taylor, Alton, Hants, Honorary Certificate.

SECOND YEAR'S STUDENTS.

Benjamin Neale Dalton, South Lambeth, first Prize, £35.

William Johns, Haverford West, second Prize, £30.

Gentlemen appointed House-Surgeons since October, 1864. 457

William Spratt, Tottenham, Honorary Certificate.

James Rawlings, St. Pinnock's Rectory, Liskeard, Honorary Certificate.

Arthur Bowes Elliott, Richmond, Yorkshire, Honorary Certificate.

Samuel John Truman, Nottingham, Honorary Certificate.

FIRST YEAR'S STUDENTS.

William Bevan Lewis, Cardigan, first Prize, £30.

John F. Codrington, Newcastle, Australia, second Prize, £25.

Frederick William Salzman, Brighton, third Prize, £10 10s. (presented by one of the Governors).

James William Barry, Ramsgate, Honorary Certificate.

Charles John Sells, Guildford, Honorary Certificate.

ENTRANCE EXAMINATION IN CLASSICS, MATHEMATICS, &c.,
OCTOBER, 1864.

Edward Colson, Great Hormead, Hertfordshire, first Prize, £25.

Edward Harry Steele, Dorchester, second Prize, £20.

James Frederick Goodhart, Brighton, third Prize, £15.

Peter Thomas Scott, London, Honorary Certificate.

Alfred Henry Baines, Leicester, Honorary Certificate.

PUPILS' PHYSICAL SOCIETY.

PRIZES FOR ESSAYS READ BEFORE THE SOCIETY.

Henry Charles Hilliard, first Prize, £10.

John Augustus Ball, second Prize, £5.

HONORARY CERTIFICATES FOR 100 CASES OF MIDWIFERY.

Chauncy Puzey.

G. E. Martindale.

James Milward.

F. J. de Lisle Evans.

W. F. Thurston.

GENTLEMEN WHO HAVE HELD HOSPITAL APPOINTMENTS
SINCE OCTOBER, 1864.

HOUSE-SURGEONS.

Edward Reynolds Ray.

Chauncy Puzey.

Arthur George Mickley.

John Jones Phillips.

Henry Couling.

Olliver Thomas Duke.

DRESSERS TO THE SURGEONS.

R. W. S. Barraclough.	James W. Walters.
G. F. E. Wilkinson.	Arthur C. Jackson.
George Eastes.	Henry Denne.
George Henry Savage.	Frederick E. Manby.
George John Muriel.	James Haslam.
Charles Glen Bott.	Alfred Charlton.
E. Fulham Turner.	John Henry Croft.
Arthur Taylor.	Herbert Lucas.
John Augustus Ball.	Alfred Harwood.
Frederick T. Tayler.	Algernon Ewen.
Thomas Collier.	Clement Palmer.
Arthur E. Wilmot.	Walter Evatt Wright.

DRESSERS IN THE OPHTHALMIC WARD.

George Paddon.	H. G. Howse.
Henry Couling.	Henry C. Hilliard.
F. W. Humphreys.	S. Wootton Bushell.
J. S. S. Perkins.	Charles Smith.
W. H. Butter.	George H. Savage.
Jabez Thomas.	John A. Ball.
George Rendle.	F. T. Tayler.

DRESSERS TO THE ASSISTANT-SURGEONS.

Henry Morris.	J. S. S. Perkins.
Benjamin C. Gowing.	Herbert Lucas.
Frederick E. Manby.	Henry Denne.
G. J. B. Stevens.	G. R. Raine.
H. G. Howse.	James Haslam.
J. W. Walters.	J. A. Ball.
R. R. Daglish.	James Riley.
Clement Palmer.	George Birch.
John Gill.	Algernon Ewen.
Reginald Eager.	J. H. Croft.
T. P. Warren.	F. C. J. Spurrell.
Herbert G. Budd.	E. A. Trimnell.
George Mickley.	R. R. S. C. C. Lloyd.
Herbert W. Fagge.	E. S. Pearse.
J. R. Leake.	W. E. Wright.
F. M. Rickard.	W. D. Reynolds.
R. Stuart.	Alfred Harwood.
A. B. Elliott.	Henry Maynard.
S. Key Watson.	Charles Sangster.
William Johns.	H. S. Taylor.
F. A. Thomas.	E. M. Owens.
H. G. Shorter.	W. Greaves.
J. P. Cheetham.	Charles Nutt.
C. J. W. Meadows.	

DRESSERS IN THE SURGERY.

H. G. Howse.	S. W. Bushell.
J. A. Ball.	C. G. Bett.
Henry Denne.	R. B. Nowell.
Herbert Lucas.	Benjamin C. Gowing.
Henry Morris.	James W. Walters.
Frederick E. Manby.	George R. Raine.
Reginald Eager.	J. H. Croft.
Algernon Ewen.	Clement Palmer.
E. S. Pearse.	George Mickley.
Richard Tudge.	Charles Hedley.
W. B. Giles.	Charles Eccles.
Christopher Jordison.	Herbert W. Fagge.
H. P. Banks.	F. C. J. Spurrell.
James Thorne.	E. L. Crowther.
G. S. Elliston.	William Spratt.
S. J. Truman.	Walter Greene.
W. C. Toulmin.	Thomas Spurgin.
J. C. Chester.	J. R. Bosworth.

DRESSERS TO THE DENTAL SURGEON.

Jonas R. Leake.	Edwin J. Fairland.
John Gittins.	George Fowler.
W. E. Wright.	Henry Shorter.
G. R. Raine.	W. H. Butler.
E. H. Trimnell.	James Thorne.
A. E. Wilmot.	J. W. Walters.

DRESSERS TO THE AURAL SURGEON.

R. R. Daglish.	T. G. Simpson.
J. W. Walters.	W. P. Boyle.
H. H. Braye.	A. Harwood.
J. C. Chester.	

SENIOR RESIDENT OBSTETRIC CLERKS.

1864.	September	.	.	.	Frederick E. Manser.
	October	.	.	.	Edward Shorland.
	November	.	.	.	Arthur George Mickley.
	December	.	.	.	Edwin Burrell.
1865.	January	.	.	.	Henry James Dwelly.
	February	.	.	.	Edward Coleridge Roberts.
	March	.	.	.	Henry Couling.
	April	.	.	.	George Paddon.
	May	.	.	.	Olliver Thomas Duke.
	June	.	.	.	George Henry Savage.
	July	.	.	.	James Milward.
	August	.	.	.	George Eastes.

**SUPERNUMERARY MEDICAL ASSISTANTS FOR ATTENDING
OUT-PATIENTS.**

1864.	May to August	.	.	.	Arthur George Mickley.
	September to December	.	.	.	John Jones Phillips.
1865.	January to April	.	.	.	Thomas D. Welch.
	May to August	.	.	.	Edwin Burrell.

CLINICAL CLERKS.

WINTER SESSION, 1864-5.

Arthur Taylor.	Edwin Burrell.
E. Fulham Turner.	H. G. Howse.
F. T. Tayler.	James Milward.
George Rendle.	S. Wootton Bushell.
R. J. Andrews.	H. C. Hilliard.
A. E. Wilmot,	Charles Smith.
Olliver Thomas Duke.	

SUMMER SESSION, 1865.

R. W. S. Barraclough.	A. B. Shepherd.
Jabez Thomas.	John Gill.
F. W. Humphreys.	George John Muriel.

POST-MORTEM CLERKS.

Henry Cecil Smith.	James W. Cooke.
Henry Weekes.	Benjamin C. Gowing.
R. B. Nowell.	George Rootes.
H. G. Shorter.	Edwin J. Fairland.
H. S. Taylor.	W. B. Giles.
James Haslam.	George Mickley.

ASSISTANT-PHYSICIANS' CLERKS.

George John Muriel.	James Thorne.
George Mickley.	Walter Greene.
John Gill.	William Johns.
Algernon Ewen.	James W. Cooke.
Herbert G. Budd.	H. K. King.
W. E. Wright.	G. S. Elliston.
H. S. Taylor.	W. Spratt.
R. Stuart.	George Fowler.
J. H. Croft.	J. R. Bosworth.
Jabez Thomas.	Henry Cheesman.
A. E. Trimmell.	A. Newsam.
C. Jordison.	O. H. Foster.
F. Knowles.	H. Maynard.
Charles Nutt.	J. W. Morison.
A. B. Elliott.	F. W. Fowke.
Thomas Spurgin.	E. N. Edwards.
E. L. Crowther.	F. S. Daldy.
B. N. Dalton.	Benjamin Duke.

GUY'S HOSPITAL.

1865-66.

THE MEDICAL SESSION

COMMENCES ON THE SECOND OF OCTOBER.

The Introductory Address will be given by THOMAS BRYANT, Esq., on Monday, the Second of October, at Two o'clock.

Gentlemen desirous of becoming Students must produce satisfactory testimony as to their Education and Conduct.

Fee for Hospital Practice and Lectures:—First year, £40; second year, £40; and £10 for every succeeding year of attendance. One payment of £100 entitles a Student to a perpetual Ticket. Materials in practical courses are charged extra.

Clinical Clerks, Dressers, Ward-Clerks, Resident Obstetric-Clerks, and Dressers in the Eye-Wards, are selected according to merit from those Students who have attended a second year. Each Dresser (except those in the Eye-Wards) has the privilege of rooms and commons in the Hospital free of charge for one month of his course. The Obstetric Clerks have the like privilege for two months each—one month as junior, another as senior. Two House-Surgeons are appointed every four months from those Students who have obtained the College Diploma.

The Students are required to conform to the Rules and Regulations for the internal management of the Hospital.

The privileges of a Student will be withdrawn in the event of neglect or misconduct.

Certificates will not be given for Lectures or Practice, unless duly attended.

The Winter Session terminates March 31st.

The Summer Session commences May 1st, and concludes July 31st.

VOLUNTARY EXAMINATIONS

ARE HELD AT FOUR PERIODS OF THE STUDENT'S COURSE,
AS FOLLOWS:

FIRST.—At Entrance—in Elementary Classics, Ancient and Modern History, and Mathematics. The Candidate who distinguishes himself most, receives £25; the second Candidate, £20; and the third, £15. The Entrance Examination will commence this year on the 9th October.

SECOND.—At the end of the first Sessional year, in all the Subjects of the first year's Course of Study. Three Prizes, the first of

£30, the second of £25, and a third of £10 10s., (presented by one of the Governors) are given according to the respective merits of the first three Candidates.

THIRD.—At the end of the second Sessional year, in all the Subjects which form the Course of Study up to that time. First Prize, £35 ; Second Prize, £30.

FOURTH.—At the end of the third Sessional year, in all the Subjects of the Curriculum. First Prize, £40 ; Second Prize, £35.

The above Prizes are not awarded unless the Candidates possess sufficient merit.

HONORARY CERTIFICATES are given to those Candidates who pass creditable Examinations.

SPECIAL EXAMINATION.

TWO GOLD MEDALS are given annually by the Treasurer to the Students who, having completed their third year, most distinguish themselves at Special Examinations in Clinical Medicine, and Clinical Surgery. One Medal is awarded in each Subject.

SINGLE COURSES OF LECTURES

MAY BE ATTENDED ON THE FOLLOWING TERMS:

Anatomy, Physiology, Demonstrations and Dissections, Medicine, Surgery, Chemistry, Midwifery, on the payment of Five Guineas for each Course of Lectures.

Materia Medica, Medical Jurisprudence, Botany, Practical Chemistry, Comparative Anatomy, on the payment of Four Guineas for each Course.

Fee for Attendance on either the Medical or Surgical Practice of the Hospital:—Three Months, Ten Guineas ; Six Months, Fifteen Guineas ; Perpetual, Twenty-five Guineas.

Several of the Lecturers have vacancies for resident private pupils.

MEDICAL OFFICERS.

Physicians.—G. H. BARLOW, M.D. ; OWEN REES, M.D., F.R.S. ; W. W. GULL, M.D.

Assistant-Physicians.—S. O. HABERSHON, M.D. ; S. WILKS, M.D. ; F. W. PAVY, M.D., F.R.S.

Surgeons.—EDWARD COCK, Esq. ; J. HILTON, Esq., F.R.S. ; J. BIRKETT, Esq. ; A. POLAND, Esq.

Assistant-Surgeons.—J. COOPER FORSTER, Esq. ; THOMAS BRYANT, Esq. ; ARTHUR DURHAM, Esq.

Obstetric Physician.—HENRY OLDHAM, M.D.

Assistant Obstetric Physician.—J. BRAXTON HICKS, M.D., F.R.S.

Surgeon-Dentist.—J. SALTER, Esq., F.R.S.

Surgeon-Aurist.—JAMES HINTON, Esq.

Eye Infirmary.—*Consulting Surgeon*, JOHN F. FRANCE, Esq.

Surgeon.—A. POLAND, Esq.

Assistant Surgeon.—C. BADER, Esq.

Apothecary.—JAMES STOCKER, Esq.

LECTURES, &c.

WINTER COURSES.

Medicine.—DR. OWEN REES and DR. WILKS, Mondays, Wednesdays, and Fridays, at three.

Clinical Medicine.—DR. BARLOW, DR. OWEN REES, and DR. GULL.

Surgery.—MR. BIRKETT, and MR. POLAND, Tuesdays, Thursdays, and Saturdays, at half-past three.

Clinical Surgery.—MR. COCK, MR. HILTON, MR. BIRKETT, and MR. POLAND.

Anatomy, Descriptive and Surgical.—MR. COOPER FORSTER, and MR. DURHAM, Tuesdays, Wednesdays, Thursdays, and Fridays, at nine.

Physiology and Microscopic Anatomy.—DR. PAVY, Mondays, Wednesdays, and Fridays, at a quarter-past four.

Demonstrations on Anatomy.—MR. BANKART and DR. C. HILTON FAGGE, daily.

Demonstrations on Morbid Anatomy.—DR. MOXON, daily, at half-past two.

Clinical Lectures on Midwifery and Diseases of Women.—DR. OLDHAM and DR. HICKS.

Chemistry.—DR. ALFRED S. TAYLOR, Tuesdays, Thursdays, and Saturdays, at eleven.

Experimental Philosophy.—DR. C. HILTON FAGGE, Wednesdays, at twelve.

Lying-in Charity.—DR. OLDHAM and DR. J. BRAXTON HICKS.

Curators of the Museum.—DR. WILKS, and DR. MOXON.

SUMMER COURSES.

Demonstrations on Cutaneous Diseases.—DR. HABERSHON, Mondays, at one.

Materia Medica.—DR. HABERSHON, Tuesdays, Thursdays, and Saturdays, at three.

Clinical Medicine.—DR. HABERSHON, DR. WILKS, and DR. PAVY.

Clinical Surgery.—MR. COOPER FORSTER, MR. BRYANT, and MR. DURHAM.

Midwifery.—DR. OLDHAM and DR. BRAXTON HICKS, Tuesdays, Wednesdays, Thursdays, and Fridays, at a quarter to nine.

Medical Jurisprudence.—DR. ALFRED S. TAYLOR, Tuesdays, Thursdays, and Saturdays, at ten.

Pathology.—DR. MOXON, Saturdays, at a quarter to nine.

Ophthalmic Surgery.—MR. POLAND and MR. BADER, Mondays, at a quarter to nine.

Aural Surgery.—MR. HINTON.

Dental Surgery.—MR. SALTER.

Comparative Anatomy and Zoology.—DR. PYE-SMITH, Tuesdays and Saturdays, at a quarter-past twelve.

Use of the Microscope.—MR. DURHAM, Mondays, at half-past twelve.

Botany.—MR. JOHNSON, Tuesdays, Thursdays, and Saturdays, at half-past eleven.

Practical Chemistry.—DR. STEVENSON, Mondays, Wednesdays, and Fridays, ten to one.

Demonstrations on Operative and Manipulative Surgery.—MR. BRYANT, Wednesdays, at three.

Registrars.—*Medical*—DR. MOXON ; *Surgical*—MR. BANKART.

DR. MOXON, MR. BANKART, and DR. HILTON FAGGE, will assist Pupils in their Studies.

THE LIBRARY, MUSEUMS, AND MODEL-ROOMS, ARE OPEN DAILY TO THE STUDENTS, FROM NINE O'CLOCK A.M. TILL FIVE O'CLOCK P.M.

MR. STOCKER, *Apothecary to Guy's Hospital*, is authorised to enter the Names of Students.

ASTLEY COOPER PRIZE.

**The Ninth Triennial Prize of Three Hundred Pounds,
*Under the Will of the late SIR ASTLEY P. COOPER, Bart.,***

WILL BE AWARDED TO

THE AUTHOR OF THE BEST ESSAY OR TREATISE

ON THE DISEASE KNOWN AS "PYÆMIA."

THE Condition annexed by the Testator is, "That the Essays or
"Treatises to be written for such Prize shall contain original experi-
"ments and observations, which shall not have been previously pub-
"lished, *and that each Essay or Treatise shall* (as far as the subject
"shall admit of) *be illustrated by preparations and by drawings*, which
"preparations and drawings shall be added to the Museum of Guy's
"Hospital, and shall, together with the Work itself and the sole and
"exclusive interest therein and the copyright thereof, become thence-
"forth the property of that Institution, and shall be relinquished and
"transferred as such by the successful candidate."

And it is expressly declared in the Will "that no Physician, or
"Surgeon, or other officer for the time being, of Guy's Hospital or of
"St. Thomas's Hospital, in the Borough of Southwark, nor any person
"related by blood or by affinity to any such Physician, or Surgeon,
"for the time being, or to any other officer for the time being in
"either of the said Hospitals, shall at any time receive or be entitled
"to claim the Prize." But, with the exception here referred to, this
Prize is open for competition to the whole world.

Candidates are informed that their Essays, either written in the
English language, or, if in a Foreign Language, accompanied by an
English translation, must be sent to Guy's Hospital on or before
January 1st, 1868, addressed to the Physicians and Surgeons of Guy's
Hospital.

Each Essay or Treatise must be distinguished by a Motto, and be
accompanied by a sealed envelope containing the Name and Address
of the Writer. None of the envelopes will be opened, except that
which accompanies the successful Treatise. The unsuccessful Essays
or Treatises, with the illustrative preparations and drawings, will
remain at the Museum of Guy's Hospital until claimed by the respec-
tive writers or their agents.

